

AUTOMOTIVE INDUSTRIES



DECEMBER 1, 1949

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New International and Diamond T Trucks
Mechanical Features of Hudson's Small Car
Draw Forming with Inexpensive Dies
Second Paris Show for Trucks
Foreign Tariff Concessions to United States

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A CHALTON PUBLICATION



SUPERLA Soluble Oil

Gain these benefits for your grinding operations

AIMING at higher production and economy, a midwest plant tried various soluble oils for the cylindrical grinding of cast-iron automotive pistons. Approximately .001 of an inch of stock is removed. Six Norton grinding machines are used on the job.

Of the products tried, Superla Soluble Oil proved superior to any and helped this plant reach its goal through these benefits:

Fewer wheel dressings. 70 to 80 pistons are produced before wheels need dressing as compared to an average of 30 to 40 pistons obtained with other soluble oils. This amounts to a big saving through reduced time and labor for dressing wheels.

Greater production. Less interruption for wheel main-

tenance adds approximately 40 minutes to the daily production time of each machine.

The shop foreman reports still other advantages in using Superla Soluble Oil. Piston diameters are easily kept within a tolerance of .0005 to .001 of an inch. There are no rusting troubles. Superla emulsions do not turn rancid and produce objectionable odors.

Why not gain these advantages offered by Superla Soluble Oil—advantages that will help you, in turn, to get greater production and economy in your plant. If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Cutting Oil Engineer nearest you.

STANDARD OIL COMPANY (INDIANA)



Saves space... Cuts Cost...with **COTTA** Reduction Unit



Broad range of ratios

Input torque from 150 to 1350
foot pounds

For use on cranes, shovels, rock crushers,
generators, pumps, etc.

When equipping a barge-mounted 8" sand dredge pump with a new 1650 Rpm Diesel power unit, space did not permit installation of the large size pulley required to drive pump at correct speed. A model SR-10E Cotta Reduction Unit (1.55 to 1 ratio) solved the problem, permitting use of a 13" O.D. pulley on the reduction unit, a 25" O.D. pulley on the pump. What speed reduction problem do *you* have?

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

**HEAVY-DUTY
REDUCTION UNITS**

"Engineered-to-order"



Only NICKEL ALLOY STEELS combine the properties specified by FITZJOHN for SAFETY and THRIFT

SPECIFY almost any reasonable combination of high strength, toughness, hardness, ductility and other mechanical properties...

That's what nickel alloyed steels provide... advantages that no unalloyed composition can match.

Furthermore, nickel alloy steels respond to mild quenching, provide high strength and elastic properties in large sections, and resist distortion and cracking in heat treatment of complex shapes... all characteristics in which unalloyed steels are deficient.

The Super Duraliner shown above, and every intercity and city bus produced by Fitzjohn Coach Company, Muskegon, Mich., attest to the dependability and economy of nickel alloy steels.

Timken Axle Company of Detroit produce Fitzjohn's front axles with steering arms and knuckles of Type 3130 nickel-chromium steel, along with steering knuckle pins made from a carburizing nickel-chromium steel, Type 3120. These steels not only assure ample safety margins in the parts, but provide long, trouble-free service life.

In rear axles...also furnished by Timken-

Detroit...all gears and pinions are of Type 4620 steel, a nickel-molybdenum grade which provides exceptional strength, resists impact and wear. This steel is readily machinable, and can be heat treated with minimum distortion.

The transmissions, produced by Clark Equipment Company of Buchanan, Mich., also utilize a nickel-molybdenum steel of the 4620 type to assure optimum dependability in all gears and supporting shafts.

Weight-saving, compactness, durability and strength...as well as superior response to fabrication...may be provided by the correct nickel alloy steel. Send us details of your problems for our suggestions. Write us today.



Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

AUTOMOTIVE INDUSTRIES

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December 1, 1949

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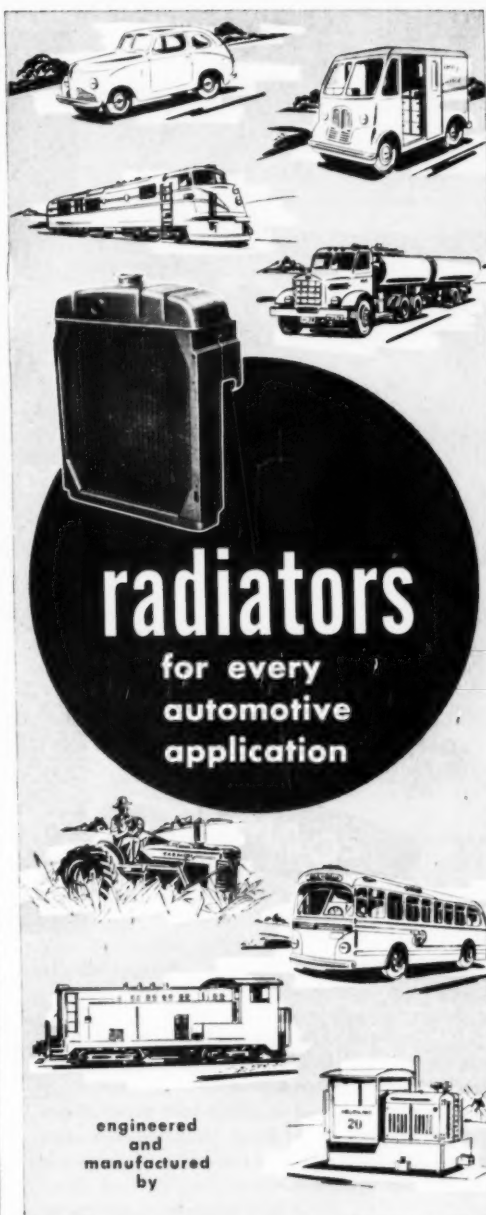
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radiators
for every
automotive
application

engineered
and
manufactured
by

YOUNG
HEAT TRANSFER
PRODUCTS



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 Plants at Racine, Wisconsin, and Maitland, Ill.

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TEXACO
REGAL OILS (R&O)
KEEP
HYDRAULIC SYSTEMS

- RUST-FREE

- SLUDGE-FREE

- FOAM-FREE



YOU get much longer pump life . . . much greater efficiency and freedom from costly stoppages . . . when you charge hydraulic systems with *Texaco Regal Oils (R & O)*. First of all, they're rust-inhibited. Moisture can't get at the metal. Valves, gears and other parts all last longer because of this protection.

In addition, the special oxidation inhibitor in *Texaco Regal Oils (R & O)* fights sludge formation even under severe conditions. This assures free action of pumps and valves . . . keeps small orifices from clogging. And *Texaco Regal Oils (R & O)* are specially processed to prevent the foaming that causes erratic operation.

You can get *Texaco Regal Oils (R & O)* in the right

viscosities—without "cutting back"—for every type and size of hydraulic mechanism. *Texaco Regal Oils (R & O)* are recommended by leading builders of hydraulic equipment, many of whom ship their units already charged with these fine, turbine-grade oils.

The success of *Texaco Regal Oils (R & O)* in improving hydraulic performance and reducing costs has been proved in plants everywhere. Let a *Texaco Lubrication Engineer* help you get these same benefits. Just call the nearest of the more than 2300 *Texaco Wholesale Distributing Plants* in the 48 States, or write:

The *Texaco Company*, 135 East 42nd Street, New York 17, New York.

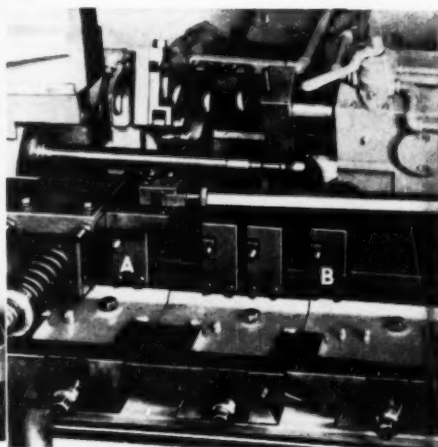
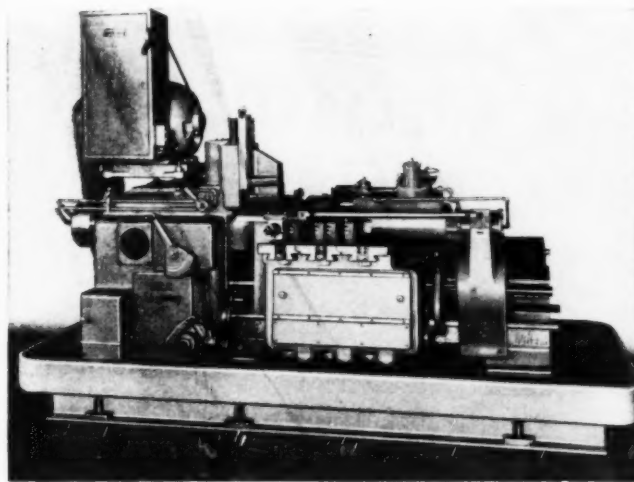


TEXACO Regal Oils (R&O)
FOR ALL HYDRAULIC UNITS

TEXACO STAR THEATRE presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



MODEL "AR" Lo-swing SLASHES COSTS ON MAIN DRIVE SHAFT

Problem: To offset high labor costs by increased production on Main Drive Shaft.

Solution: The Model "AR" Automatic Lo-swing Lathe was selected for this job because it had sufficient weight and rigidity to insure long tool life at high cutting speeds with sintered carbide tools.

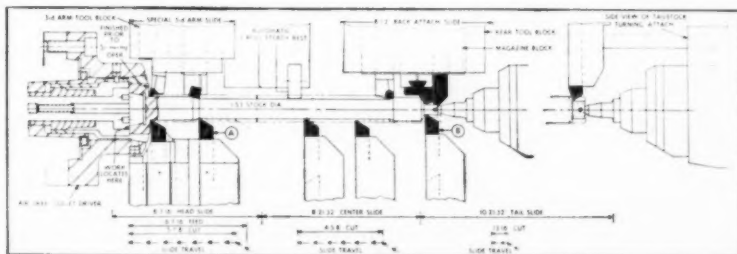
Shafts are delivered to the Lathe with the gear end finished to size and the small end centered. The line drawing shows a cross section of the collet chuck which centers and drives the shaft on the gear end. This method of driving increased the rigidity of the shaft. The three-roll steady rest is automatically operated, the rolls being advanced to contact the shaft as soon as tool "A" turns a spotting wide enough to clear the rolls. Tool "A" is the only tool cutting until the steady rest rolls support the piece, after which all the other tools start cutting simultaneously.

Another feature on this machine is the Automatic Tailstock Turn-

ing Attachment, shown in the close-up illustration, which is used to rough turn the small end of the shaft ahead of tool "B" which finish turns. This small diameter is held within close limits by this method and a green grind operation is eliminated.

The complete cycle is automatic; the operator simply loads and unloads the parts and pushes the starting button. All tools are carbide. Material is SAE 5140 steel forging and the machine cycle time is 30 seconds.

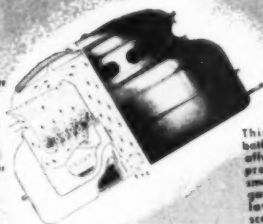
If you want lower production costs, let us help you with your turning problems.



SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

New style combination oil bath cleaner and silencer designed for use on down draft carburetors where head room is not available for conventional type combination cleaner and silencer.



This United oil bath air cleaner affords real dust protection for small engines used on garden tractors, power lawn mowers, motor scooters and many other applications of such power units.



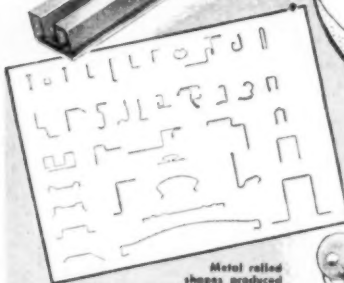
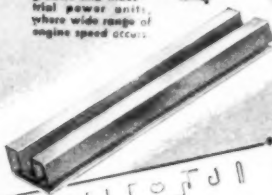
Popular style of oil bath air cleaner used on trucks where cleaner is mounted directly on air horn of down draft carburetor.



Tractors, combines and other agricultural engines are protected by this standard type United oil bath air cleaner.



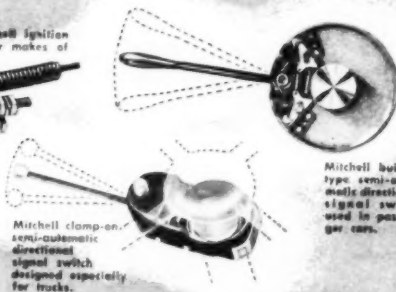
This United oil bath air cleaner is designed especially to protect Diesel engines in truck, tractor, graders and industrial power units, where wide range of engine speed occurs.



Metal rolled shapes produced in Philadelphia plant — complete range of metals, designs, gauges, stainless steel, aluminum, brass, bronze, copper, cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, all industrial uses.



Conventional type Mitchell ignition switch used on popular makes of cars and trucks.



Mitchell built-in type semi-automatic directional signal switch used in passenger cars.

Mitchell clamp-on semi-automatic directional signal switch designed especially for trucks.

UNITED SPECIALTIES PRODUCTS

GEARED TO THE SWIFT MOVING AUTOMOTIVE WORLD

From the days of crude pioneer automobiles to the smooth lines of 1949, United Specialties Company has kept its products in step with automotive's ever-changing developments.

Today, in United's Air Cleaner Division, oil bath air cleaners are built for every type of internal combustion engine, including diesels. Millions of car, bus, truck and tractor engines are protected by these efficient cleaners.

The semi-automatic Directional Signal Switch — a notable contribution to safer driving, is a product of United's Mitchell Division. Another Mitchell product, the durable, highly regarded Mitchell ignition switch, has long been standard original equipment on popular makes of cars and trucks.

In addition Mitchell makes a complete range of rolled shapes in a variety of designs and gauges — cold-rolled, drawn and pressed.

UNITED SPECIALTIES COMPANY

United Air Cleaner Division, Chicago 28 • Mitchell Division, Philadelphia 36

AIR CLEANERS ★ METAL STAMPINGS
ROLLED SHAPES ★ IGNITION AND
DIRECTIONAL SIGNAL SWITCHES ★ DOVETAILS

DANLY DIE SETS

*less
time*

IN THE DIE SHOP

Reliable Danly precision makes die assembly quicker and easier... possible reworking of die sets to make them square and true is eliminated. Precision leader pin and bushing fits assure accurate die closure and protect delicate die components. Danly Die Sets mean better dies in less time!

*longer
life*

ON THE PRODUCTION LINE

Hardened, ground and lapped leader pins resist wear... accurate die relationship minimizes punch shearing and die breakage. Precision Danly Die Sets justify die cost's precision in the press setup, preventing premature die wear. Danly Die Sets mean more parts per grind!

Courtesy Quality Hardware, Chicago

Danly precision makes every Danly Die Set a reliable foundation for the finest die work. And in addition to the performance advantages they assure, Danly Die Sets are quickly available, too, from a nationwide system of completely stocked assembly branches.

Large or small, standard or special, there's a Danly Die Set to meet every tooling need. Just contact your nearest Danly branch for fastest delivery of the best in die sets.

Danly Machine Specialties, Inc.

2100 South 52nd Avenue, Chicago 50, Illinois.



WRITE FOR THIS FREE BULLETIN

...and see how Danly's special die set machining service can help reduce your costs.

DANLY PRECISION DIE SETS... STANDARD AND SPECIAL

OVER 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

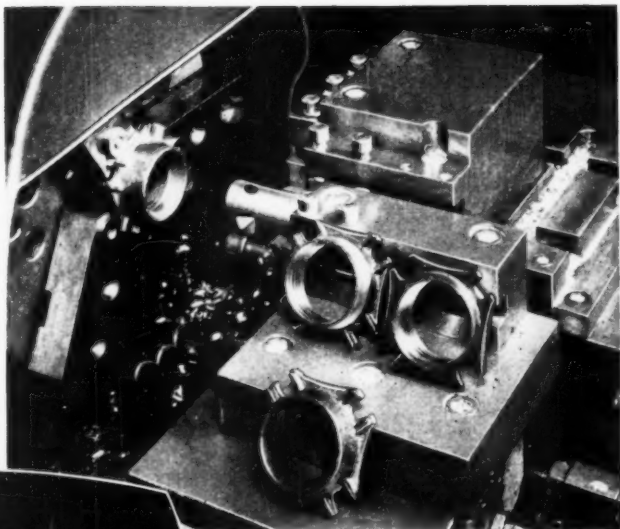
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- *Long Island City 1, 47-28 37th Street
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- *Milwaukee 2, 111 East Wisconsin Avenue
- *Philadelphia 44, 18 West Chelton Avenue
- *Rochester 4, 16 Commercial Street

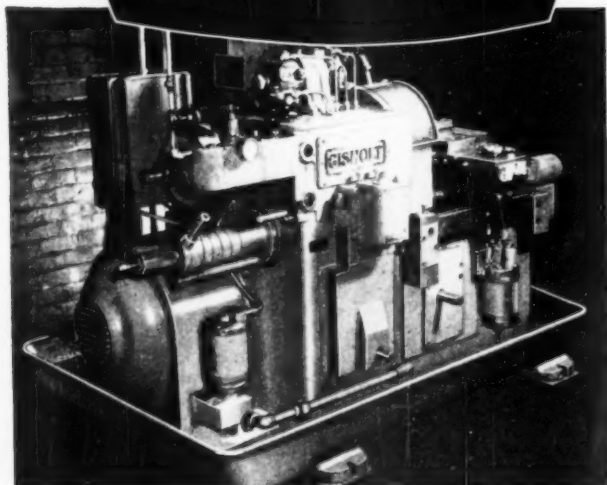
*Indicates complete stock

DANLY

Small Job Shop Catches the BIG IDEA



cuts costs with—
GISHOLT
No. 12 HYDRAULIC
AUTOMATIC LATHE



No matter whether the shop is large or small . . . if there's volume, there's the opportunity to make money faster with automatic machining.

The Kilbourn Engineering Company of Milwaukee saw it—and proved it again—subcontracting these parts for electric hot water heaters with the Gisholt No. 12 Hydraulic.

Greater Production

With its fast automatic cycle and multiple cutting, the Gisholt turns out these parts at twice the rate of the previous method. A man merely loads and unloads the machine. The owner is not limited to this one job either. It is easily set up to handle a variety of work up to 12" in diameter.

Corner for Profit

Such work can be highly profitable for job shops. Especially when the whole operation can be tucked into one small corner of the shop as this one is.

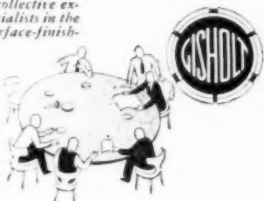
Progressive thinking like this is what makes many small shops grow into big ones. Gisholt engineers can help you with all kinds of ideas for making the most of machine tools.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

EATON

Zero-Lash

Registered U. S. Patent Office

HYDRAULIC VALVE LIFTERS

The Modern Method of Valve Actuation

Millions of Zero-Lash Hydraulic Valve Lifters and Zero-Lash adjusting units—designed and developed exclusively by Eaton Manufacturing Company—have gone into leading automotive, aircraft, tractor, marine and industrial engines in the last 17 years. They have contributed:

- Freedom from Tappet Adjustments for the Life of the Engine.
- Accurate Valve Timing and Perfect Seating at All Engine Speeds and Temperatures.
- Longer Life for Valves and Seats.
- Silent Valve Train Operation.

Since 1932 Eaton Engineering Departments have been engaged in constant research and development of improved designs and of new wear-resistant materials which make today's—and tomorrow's—Zero-Lash Hydraulic Valve Lifters the truly modern method of valve actuation.



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AMERICAN QUALITY SPRINGS put "*Performance insurance*" into any product!

THE ever-swelling tonnages of springs being shipped out of our mills . . . the enthusiastic comments our salesmen and engineers are receiving from all quarters on the performance of these springs, are hard and fast proof of this fact:

American Quality Springs are one of the best forms of "performance insurance" you can possibly give your product!

Just 30 minutes spent in one of our spring mills would convince any spring user that he could place complete confidence in our American Quality Springs. For he'd

see machinery and facilities that are generally regarded as the finest in the industry. He'd witness the skilled work of some of the best spring and wire men in the country. And he'd see the over-all efficiency which is characteristic of all of our wire product operations.

Our engineers know springs. They're ready to tackle your problem. Why not get in touch with us soon?

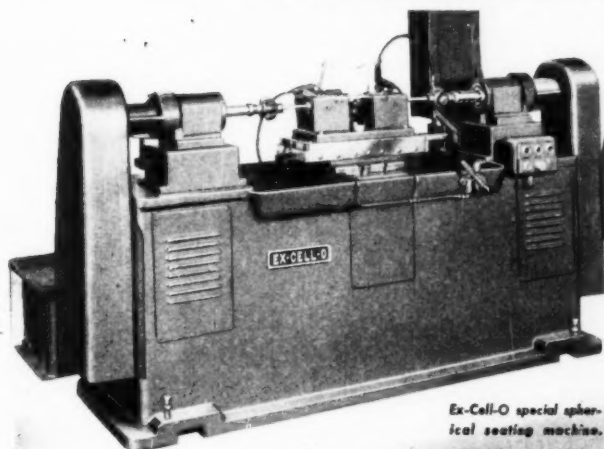
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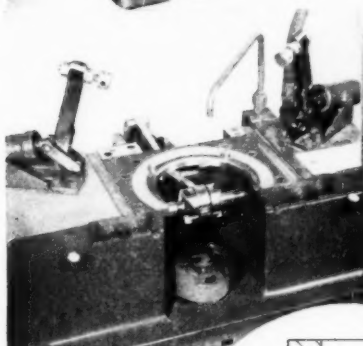
UNITED STATES STEEL

GOT A *Machining Problem?*



Ex-Cell-O special spherical seating machine.

SEE
EX-CELL-O



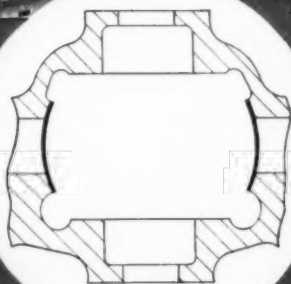
Side View of work
holder and cutter
on Ex-Cell-O special
spherical seating
machine.

Ex-Cell-O Machine Eliminates Slow Hand Operation on Difficult Job!

Cutting spherical seats inside automotive differential cases is ordinarily a slow hand operation that is out of place in today's production procedure. An operator working on a drill press loads and clamps the part, runs the tool holder into the work, engages the cutter, then cuts the first seat. This cut completed, he withdraws the tool holder and removes the tool. Then he unloads and reloads or indexes the part and repeats the process for the other seat . . . On the Ex-Cell-O special machine shown here the operator merely loads the part, shifts a valve that controls the clamps and presses a start cycle button. At the completion of the cycle he removes the part . . . that's all the operator does. The machine does the rest!

If you have a machining problem, see your nearest Ex-Cell-O representative.

Light Heavy line
slow operation per-
formed on differ-
ential cases with
Ex-Cell-O special
machine.

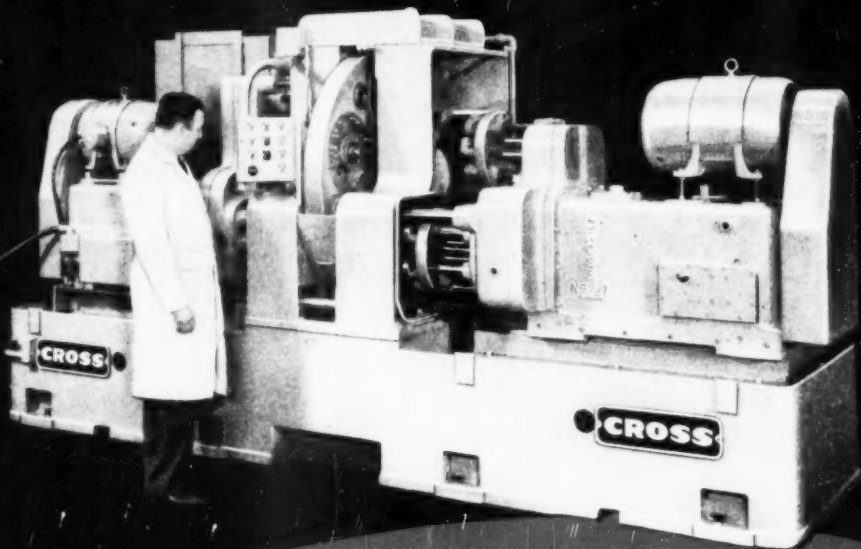


EX-CELL-O CORPORATION

DETROIT 32
MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • HEAVY EQUIPMENT

Another Special by Cross



Drills, Chamfers and Reams *Flywheels*



- ★ 140 pieces per hour at 100% efficiency.
- ★ Five station index trunnion.
- ★ Fluid motor drive for indexing.
- ★ Station One, load and unload; Station Two, drill 16 holes; Station Three, chamfer 16 holes; Station Four, chamfer 15 holes; Station Five, ream 3 holes.

Established 1898

THE **CROSS** CO.
DETROIT 7, MICHIGAN

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING



From "One Man" to "One Finger" Top

Probably the greatest single contribution to the increased popularity of the open car has been the improvement of convertible top design and top operating mechanisms. The Hydro-Lectric system, developed and perfected by Detroit Harvester, provides smooth, positive action, and trouble-free operation. This is the "no problem" system. The long time bug-a-boo of automatic top lift mechanisms—binding due to uneven lift rates—has been eliminated by the perfect equalization of hydraulic effort on both sides.

The same Hydro-Lectric power unit which operates the top furnishes sufficient energy to motivate door windows, quarter windows, rear windows, deck lifts, hood, driver's seat.

★ ★ ★

*Hydro-Lectric Top, Window, and Seat Control Systems
Convertible Tops • Automobile Body Hardware
Manual Window Regulators • Window Glass Channels
Power Take-Offs • Contract Production Parts
Farm Mowers • Power Sweepers*

DETROIT HARVESTER COMPANY

EXECUTIVE OFFICES: 2550 GUARDIAN BUILDING, DETROIT, MICHIGAN

PLANTS: • DETROIT • YPSILANTI • TOLEDO • ZANESVILLE

Bendix Products

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

HYDROVAC

THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

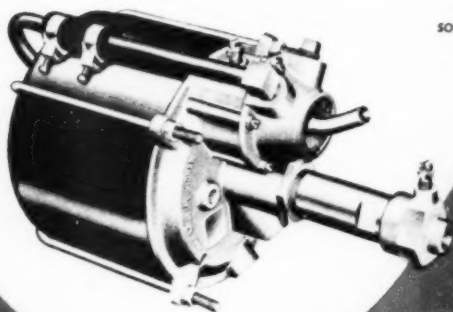
More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one—the Bendix Hydrovac—is preferred above all others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further

suggests, however, that Hydrovac® power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

*REG. U.S. PAT. OFF.

BENDIX PRODUCTS
DIVISION of
SOUTH BEND 20, INDIANA

Export Sales: Bendix International Division
72 Fifth Avenue, New York, N. Y.



Continuous
Emergency
and Parking Brake

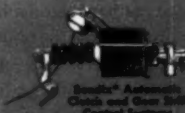


B-4C Power Braking
System for Cargo Trailers



Bendix Hydraulic
Power Steering

BUILDERS
OF THE BASICS
OF BETTER
MOTOR VEHICLES



Bendix® Automatic
Clutch and Floor Shift
Control System



Bendix Hydraulic
Power Gear Shifter



Bendix® Brakes for
Buses, Trucks, and
Passenger Cars

AUTOMOTIVE INDUSTRIES



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The Authoritative Technical and News Magazine
 That Gives Comprehensive Coverage, Domestic
 and Foreign, of These Industries:

Passenger Car	Engine	Parts and Components
Truck	Body	Accessory
Bus	Trailer	Production Equipment
Aircraft	Road Machinery	Service Equipment
Tractor	Farm Machinery	Maintenance Equipment

High Spots of This Issue

Foreign Tariffs Lowered by Annecy Agreements

Reciprocal trade agreements recently concluded at Annecy, France, bring 10 additional European and Latin American nations within the trade program mapped out at Geneva in 1947. This report describes major concessions granted the United States in various categories of interest to the automobile, aviation, and related industries. See page 24.

Second Paris Show Necessary for Trucks

Because the Paris Grand Palais is now too small for the needs of the whole automotive industries, two shows were held this year. The second show, featuring commercial vehicles, displayed trends toward greater use of Diesels, underfloor and rear mounted engines, and single tires taking the place of duals, as discussed starting page 30.

Smaller, Lower-Priced Hudson

Long awaited details of the new smaller Hudson are revealed in this account. How Hudson is able to produce a shorter model without affecting assembly procedures and requiring only one additional sheet metal change is also illustrated and explained. Turn to page 33.

New Diamond T and International Trucks

Two articles in this issue afford interesting glimpses into structural and design features of these important truck lines. Begin them on page 36 and page 44 respectively.

Draw Forming With Inexpensive Dies

Here is presented up-to-date information and examples of deep drawing and waffle forming, particularly as applied to aircraft manufacture. Drop hammer forming and its application to waffle forming are among the metalworking procedures also covered. Page 40.

26 New Product Items

And Other High Spots, Such As:

Diesel engines, fuels and lubricants discussed at the SAE National Meetings held in St. Louis in November; tests conducted on an aluminum alloy semi-trailer for the transport of gasoline; and new techniques in operation at Ford's forge plant.

News of the Automotive Industries, Page 17
 For Complete Table of Contents, See Page 3

**AUTOMOTIVE
 INDUSTRIES**
 Reg. U. S. Pat. Off.

Six Parts

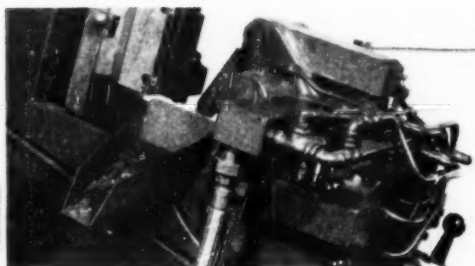
...BROACHED
...CUT OFF
...EJECTED

*Each Cycle of
the Ram*

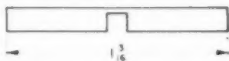
CINCINNATI



Many small parts, like the one illustrated in the drawing, start life as bar stock. The problem is—how to cut them off from the parent bar without undue loss of material, and at the lowest cost. Cincinnati Application Engineers have devised a way to combine this operation with broaching. In effect, the cutting off operation is free! Applying this idea to small steel blocks for electric razors, a CINCINNATI No. 1-30 Single Ram Vertical Hydro-Broach, illustrated at the left, was tooled up with an automatic shuttling type fixture. Bars are stacked three high. Two sets of parts are broached and cut off each stroke of the ram, making a total of six parts per cycle. During the return stroke of the ram, broached parts are ejected into a chute, and the bar stock automatically advanced for the next cycle. When the stock is used up, the machine automatically stops, and the operator reloads three more bars. The method is simple, efficient, and very low in cost per piece. Cincinnati Application Engineers have tooled up several Hydro-Broach Machines to broach and cut off simultaneously. Perhaps you can employ this low cost technique. Production can be almost any reasonable quantity per hour. Write for our recommendations; include blueprint and complete details.



Close-up of ejector chute side of the fixture.



Drawing of part broached on the equipment illustrated here.

Part Name Block
Material C. R. Steel
Operation Broach slot and cut off
Stock Removal From solid
Production Average 2280 per hour

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 101, No. 11

December 1, 1949



NEW 1950 PONTIAC

Following the pattern set last year, the new 1950 Pontiac line offers Chieftain and Streamliner Series in de luxe and standard models with six- and eight-cyl engines, and with Hydra-Matic transmission as optional equipment. Bodies and sheet metal remain unchanged, but appearance has been freshened by a new grille having heavier horizontal bars, and with the main grille bar extended to wrap around the front fenders.

Industry May Still Build Six Million Units in '49

Despite losses suffered from the steel and coal strikes, the automobile industry this year still has a good chance to hit a total of six million units in U. S. plants. Even though many plants already have closed for lack of steel or model change, and more will do so, it is not believed that the suspensions will be long enough to prevent another quarter million vehicles to be built before year-end.

Hudson in Medium Price Range with New Model

Prices announced by Hudson for its new shorter Pacemaker model reveal that the car is neither a small car nor in the low-priced field. It is, however, shorter by four inches in wheelbase and six inches in overall length than the regular Hudson line, and is also priced \$250 and \$275 under corresponding models in the larger series. The Pacemaker actually falls into the medium price class, being somewhat higher than Pontiac, Dodge, Studebaker Champion and Nash Statesman and about the same as the Buick Special. Factory list prices are \$1675 for the three-passenger coupe and \$1775 for the brougham (two-door).

which is \$250 under the corresponding models in the larger series, and \$1795 for the four-door sedan and six-passenger club coupe, which represents a reduction of \$275 under the same models in the larger line. The prices are exclusive of federal, state and local taxes, transportation, and dealer handling charges.

Ford to Build Transmission at New Cincinnati Plant

The new Mercury-Ford automatic transmission will be manufactured at a new plant to be built by Ford near Cincinnati. The announcement that the company will purchase a 55-acre site just east of Cincinnati emphasizes the Ford policy of decentralization of its manufacturing operation. Ford will build a one-story plant containing approximately 400,000 sq ft of manufacturing area. The new plant will be a unit of the company's general manufacturing division. Marvin L. Katke, who had been superintendent of the Oldsmobile engine plant at Lansing, Mich., has been appointed manager of the new transmission plant.

Willys Moves Body Job from Briggs to Toledo

Willys-Overland Motors is moving all tools, dies, jigs and other equipment

for producing station wagon bodies from the Briggs Mfg. Co. plant at Detroit to its own body shops at Toledo, O. Briggs has been building the bodies for Willys since June, 1948. Last December, Willys moved manufacture of stampings for Jeep bodies from the American Central plant in Connorsville, Ind., into its new \$5 million body stamping shop. With station wagon body building now returned to the home plant, Willys for the first time since early in the '30's will be making its own bodies and stampings for its complete line of commercial and passenger cars.

Pontiac Announces 1950's; Cuts Hydra-Matic Price

GM's Pontiac Motor Div. has made a cut of \$250 on the new all-steel station wagon, and no change in price on other 1950 models.

A cut of \$25 in the price of the Hydra-Matic transmission by the Pontiac, Oldsmobile and Cadillac divisions of GM is the first reduction since the Hydra-Matic was introduced by Oldsmobile ten years ago. Price of the unit offered as optional equipment on all Pontiac models and on the Oldsmobile 76 will now be \$158.50 an actual reduction of \$26.50 since the Federal excise tax is reduced by \$1.50 because of the lower base price. On the Oldsmobile 88 and 98 models, which carry the Hydra-Matic as standard equipment, the price of the car is reduced by \$26.50. On Cadillac which has offered Hydra-Matic as optional equipment on all models at \$200, the price will now be \$174.25. It is understood that part of the price cut is due to lower prices from GM's Detroit Transmission Div., supplier of Hydra-Matic to the three car divisions, with the balance of the reduction being made by Oldsmobile, Pontiac, and Cadillac. Advertised delivered price of the new all-steel station wagon now is \$2280 for the Six, and \$2348 for the Eight.

The new 1950 Pontiac line (see cut on this page), has new parking lamps mounted between the bumper and main grille bar below the headlamps. The center grille support is enlarged. Wheelbase remains 120 in. on all models. Interior treatment on all body models has been completely restyled and features a wider selection of trim

NEWS of the AUTOMOTIVE INDUSTRIES

options. One of the interesting features is a molded rubber floor mat, for rear compartment floors of all standard sedans, which simulates deep pile wool carpet.

Body styles are as follows: Chieftain Series (standard or de luxe): four-door sedan, two-door sedan, sedan coupe, convertible coupe, Catalina coupe (de luxe and super-de luxe), business coupe and four-door sedan taxicab (standard only). Streamliner Series (standard or de luxe): four-door sedan, sedan coupe, metal station wagon, and sedan delivery (standard only).

Coming to mechanical features, the major item is the $\frac{1}{8}$ in. increase in bore of the eight-cyl engine, displacement being upped by 19 cu in. to 268 cu in. Standard compression ratio for both six- and eight-cyl engines is 6.5 to 1.

eight-cyl engine have made it possible to run the engine at lower speed and permit use of a lower reduction—3.9 to 1—rear axle ratio. The rear axle ratio with Hydra-Matic remains at 3.63 to 1. Standard rear axle ratio on the sixes remains at 4.1 to 1.

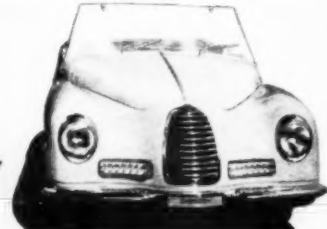
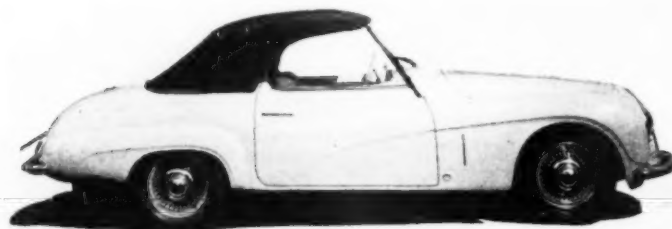
K-F Gives Pension to Workers

The Kaiser-Frazer Corp. is the second automobile manufacturer to conclude a pension agreement with the UAW-CIO. The agreement follows the recommendations of the steel industry fact-finding board and will cost K-F about six cents an hour. In addition, K-F will increase its payments into the already existing social security

general manager of the Ford Div. Truck prices will also remain unchanged. He said that Ford would absorb the increased costs. He also announced that the full prewar discount of 25 per cent on passenger cars was restored to dealers coincident with production of 1950 models. Dealer discount was raised to 25 per cent from 24 per cent.

IHC Spent \$30 Million for 1950 Truck Changeover

The new L line of International trucks (see page 44) required the greatest expenditure of any new models in International Harvester Co. history. More than \$30 million was spent for the production changeover necessary.



SPORTING CUSTOM

The Carrosseria Castagna company of Milan, Italy, exhibited the Fiat 1100 cabriolet sport car chassis with their custom-built body, shown above front and side view, at the recent Paris Auto-

mobile Salon. Seating two, this automobile is powered by a four-cyl engine, which develops 35 bhp at 4400 rpm. The Fiat 1100 has a wheelbase measuring 95 $\frac{1}{4}$ in.

The six is rated 90 bhp (max.) at 3400 rpm; while the eight is upped to 108 bhp (max.) at 3600. Maximum torque of the eight is 208 lb ft at 1800 rpm. A special 7.5 to 1 compression ratio head is offered as optional on both the six and eight, making mandatory the use of premium fuels, and increasing maximum output of the six by three hp and of the eight by five hp.

The change on the eight has been accomplished without changing cylinder centers. However, diameter of the rear bearing has been increased and with it Pontiac has adopted a positive type oil seal, the construction being similar to that on the six and interchangeable with it. Another change is the adoption of internal type valve spring dampers on the eight only. This was done because there was no longer space to accommodate the external dampers used heretofore. Clutch diameter of eight has been upped to 10 in. from the former 9 $\frac{1}{2}$ -in. size. The increased horsepower and torque of the

fund by two cents an hour, bringing the total cost for the "package" to 82 $\frac{2}{3}$ cents an hour. Free hospitalization, surgical benefits, and sick and accident disability benefits were increased last February and the extra two cents will be used to maintain the fund in sound condition with no increase in present benefits. Details of the pension agreement which runs for five years remain to be worked out, and although no minimum monthly benefit has been specified, it is believed that it will be \$100 a month including Federal social security payments, the same as was granted to Ford employees.

Ford Holds Price Line on Cars and Trucks

Despite increased production cost resulting from the steel and coal strikes, the prices of 1950 Ford passenger cars just announced will not go up, according to L. D. Crusoe, vice president and

involving revamping of facilities, layouts and assembly lines in the company's Fort Wayne and Indianapolis, Ind., and Springfield, O., plants; the acquisition of thousands of new machines, tools, dies, patterns, gages and fixtures; and the addition of many new buildings and extensions to existing facilities.

Tool Builders Name New Officers

David Ayr, president and general manager, Hendey Machine Co., Torrington, Conn., is the new president of the National Machine Tool Builders' Association, following his recent election at its 48th annual meeting at White Sulphur Springs, W. Va. Richard E. LeBlond, president of the R. K. LeBlond Machine Tool Co., Cincinnati, O., and Frederick S. Blackall, Jr., president, the Taft-Peirce Manufacturing Co., Woonsocket, R. I., were elected

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first and second vice presidents, respectively. Jerome A. Raterman, president, the Monarch Machine Tool Co., Sidney, O., was elected treasurer. Tell Berna continues as general manager and Mrs. Frida F. Selbert was again named secretary. Three new directors were also elected. They are Mr. Blackall, Mr. Raterman and R. W. Glasner, president of the Clearing Machine Corp., Chicago, Ill. They will serve three year terms.

Ford to Give Pensions to Salaried Workers

The Ford Motor Co. will provide salaried workers with a \$100 monthly, non-contributory pension plan, similar to that granted hourly-rated employees. In addition, employees with a base salary above a stated amount (probably \$3600 a year) will be entitled to participate in a supplemental pension program with additional benefits paid for by joint contributions. The present pension program for salaried workers will be merged into the new plan, with no loss of credits.

Purulator to Move to New Site

Purulator Products, Inc., manufacturer of automotive oil filters and other types of filtration equipment, is planning to consolidate expanding operations in a larger, single-unit plant at Rahway, N. J. The proposed Purulator plant is to be largely a one-level steel and concrete structure, and is to



FIAT FOR FOUR

The Fiat 1100 E four-seater sedan is fundamentally model 1100, the utility four-cyl four-seater car. The engine develops 35 bhp at 4400 rpm. The car's wheelbase is 95 1/4 in. and has independent front wheel suspension, and rear suspension through semi-elliptic springs.

provide nearly 300,000 sq ft of production and office space.

Navy Announces \$758 Million in New Contracts

The Navy Dept. recently placed an order with Reo Motors Inc., for eight ammunition trucks, model D-19B-D5, for a total contract price of \$35,603.84. They will be powered with Buda engines. A contract has also been awarded the Tubing Appliance Co., Inc., of Los Angeles, to supply the Navy with 1490 sets of Type F ratchet wrenches.

and 5822 component parts for a total of \$241,731.29. Still a third Navy contract went to the National Battery Co., Depew, N. Y., for 10,041 24-v aeronautic storage batteries for a total of \$469,121.25.

The Navy has also announced the award of a \$10,368,600 contract to the Pratt & Whitney Div., United Aircraft Corp., East Hartford, Conn., for turbojet engines. Other contracts awarded were to AiResearch Mfg. Co. (Div. of Garrett Corp.), Los Angeles, Calif., for gas turbine air compressor unit, air turbine starters, motor actuated shut-off valves, totaling \$535,968; Bendix Aviation Corp. (Eclipse-Pioneer Div.) Teterboro, N. J., for generators; voltage regulators; exciter controls and spare parts, \$149,788, and starters, \$60,690; Grumman Aircraft Eng. Corp., Bethpage, L. I., N. Y., \$560,310, for airplane conversion.



SPORT FOR TWO

The new Czechoslovakian Tatra T87 Sport car shown above, seats two, and is powered by a four-cyl air-cooled engine with about 119-cu in. piston displacement. The car is said to have a top speed of approximately 124 mph.

Authenticated

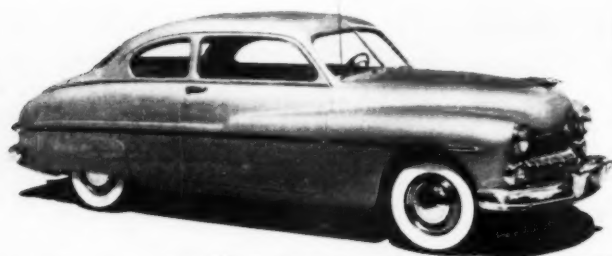
Zand to Present Aircraft Paper at SAE Annual Meeting

Dr. S. J. Zand, vice-president in charge of engineering for the Lord Mfg. Co., Erie, Pa., will present a paper at the annual meeting of the Society of Automotive Engineers in Detroit, Jan. 9-13, entitled "Fatigue Life of Aircraft Engine Mounting Components."

GM to Lose \$400 Million in Sales Due to Steel Strike

Direct loss of sales to GM due to the steel strike will amount to about \$400 million, according to M. E. Coyle, GM executive vice president. He added, however, that despite the lowered sales

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MERCURY FOR FIFTY

The new 1950 Mercury is shown here in the six-passenger coupe model. The front end has been restyled by tying in oblong chrome parking lamps with the grille, and a new nameplate is mounted on a chrome strip replacing individual letters. The 110 hp engine incorporates a number of mechanical changes.

in the fourth quarter, GM sales this year will be in the neighborhood of \$5.6 billion. He added also that GM production this year will be approximately 2.8 million vehicles, or somewhat more than 40 per cent of the entire industry total. He added that GM presently has no plans to reduce prices.

Announce New Mercury Line for 1950

The 1950 line of Mercury automobiles (see cut on this page), recently announced by the Ford Motor Co.'s Lincoln-Mercury Div., has increased rigidity of the frame through increased gage of steel where necessary; 50 per cent easier operating full-type hand-brake; increased ground clearance by changing from 3½ to 2½ in. rear shackles; and plastic lenses in parking lamps and tail lamps. There are new rotary-type door locks on the 1950 Mercury, and accompanying the new-type locks are newly-designed pull-type door handles. The door is opened with a push button below the handle. Other styling changes include a new deck lid handle which embodies the Mercury insignia, and new bumper guards with a cross bar bearing the name Mercury. The new line has a new "Safe-T-Vue" instrument panel in which all the dials—speedometer, gages, clock, and radio dial—are placed behind a single clear plexiglas panel running the length of the control section. Nine exterior colors are available in the regular 1950 Mercury line with one extra color, Miranda Yellow, exclusive on the convertible.

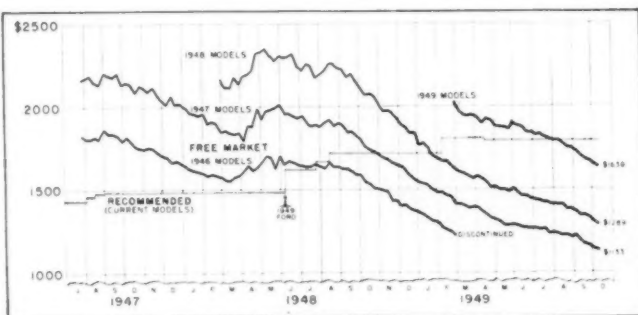
The 110 hp Mercury engine has been improved by a new timing gear made of laminated composition; reduction in fan speed to 9/10 of the engine speed; new three-point narrow wedge belt drive to insure uniform water pump

performance and eliminate slippage. Other engine additions include an oil squirt hole in the connecting rods to provide instant lubrication of the cylin-

by dissolving its regional system and putting all zones under the supervision of three divisional sales managers. Replacing the four regions previously set up will be three divisions known as Eastern, Western and Pacific Coast. These will be headed by Ernest J. Platfoot, Leo E. Fenn, and R. J. Froiseth, respectively. One result of the reorganization will be the delegation of maximum authority to zone managers.

Automotive to be Big Item in \$1.3 Billion Arms Aid

Military trucks, prime movers, trailers, and spare parts will loom large in the recently-approved \$1.3 billion program of arms aid for Western Europe and other nations friendly to the United States. At this time, however, it is impossible to tell exactly what quantities of automotive equipment will be shipped abroad. For example, while initial appropriation requests indicated \$327 million for vehicles and \$100 million for



GOING DOWN?

The advertised free market prices (average of offering prices in classified advertisements of Sunday newspapers from 10 large cities) of Chevrolet, Ford, and Plymouth cars as compared with manufacturers recommended retail prices (advertised delivered price plus 10 per cent for accessories and \$50 freight) are shown above. Station wagons and convertibles are excluded, and interdecile averages for offerings of each make are combined with weights proportional to production.

der walls after a cold start; new cylinder wall finish with improved oil control; new rubber seal rings on the intake valve stem guide; and new chrome-plated top piston rings. Other engine improvements are a new oil bath air cleaner with improved sound-absorbing chamber, and relocation of the oil filter off the head bolts to assure proper torquing.

Packard Reorganizes Distribution Staff

The Packard Motor Car Co. has reorganized its distribution organization

spare parts, it has not yet been determined how much of this will come from reserve stocks of the Army.

Changeovers and Strike Curb Car Production

Automobile production is currently at a very low ebb because of shutdowns at several plants for model changeovers and because of steel shortages. However, it is believed that within the next two weeks many plants will again be operating, and production should be showing a definite upswing by the middle of the month. By that time model change-

NEWS of the AUTOMOTIVE INDUSTRIES

overs should be completed with initial assembly of 1950 models well underway, and plants closed by the steel shortage should be again operating. Chrysler divisions, with the exception of Plymouth, got started on 1950 model production late in November on a very limited scale after being forced down Nov. 4 because of the steel shortage. Plymouth continued operations until Thanksgiving and then went down for model changeover and inventory, and should be going again on new models early this month. Pontiac, Buick and Oldsmobile were closed the last week of November: Pontiac because of the steel shortage and the other two because of both the steel shortage and model change. Production is expected to be resumed before the middle of December. Chevrolet operated through December before going down for inventory and model change and should be going again about the middle of the month. Nash was also forced down for lack of steel Nov. 18, but should be in production again soon, and Studebaker which managed to operate all of November before closing will resume operations Dec. 12. Packard will resume operations Dec. 5 after being closed since Nov. 25 when Briggs Mfg. Co., which supplies bodies, closed for inventory taking. Hudson, which was able to stockpile steel during October when it was down for model change, will apparently be able to keep operating. Ford is also expected to continue production at its Ford and Mercury operations the rest of this year. The Lincoln assembly line, inactive since Nov. 10, will get going again sometime this month. Kaiser-Frazer, down since Oct. 21, has not announced when it would resume operations.

Federal Reserve Sees Strong Car Market for Next Year

Although half the postwar new cars have gone to buyers with \$5000 a year or more income (the remainder to those earning between \$2000 and \$5000), the Federal Reserve Board has renewed its forecast of a continued strong market for both new and used cars for the next 12 months or more. Its basis for this belief is: a) buying power (assets and credit) is greater than prewar; b) ownership rate in lower fifth income bracket (mostly used cars) increased with more than doubling of prewar income; c) frequency of all ownership same as prewar although population has increased; and d) seven out of every ten cars are seven or more years of age compared with the prewar ratio of two out of ten.

Military Aid to Bring Machine Tool Orders

The machine tool industry is expected to get some substantial orders out of the \$1 billion appropriated for military aid to Europe. It is reported that about \$30 million will be set aside for equipment to be used in armament factories in Europe.

Oswald Resigns as Head of Ford Styling

John Oswald has resigned as executive engineer of styling and body engineering of the Ford Motor Co. He joined Ford in June of 1947 after leaving GM where he had been assistant to the vice president in charge of engineering. Harold T. Youngren, Ford vice president in charge of engineering, said that George W. Walker, styling consultant, will assume increased responsibilities in Ford styling activities. A successor to Mr. Oswald will be named soon.

Dearborn Motors Adds Fork Lift to Line

Dearborn Motors dealers have added two pieces of specialized equipment for the Ford tractor of interest to manufacturing plants. One is a fork lift which can be used for palletizing or warehouse use. There are two sizes with 1000 lb and 1500 lb capacity, and with lifts of 8 and 10 feet. Another item of interest for use with the tractor

is equipment to fit it as a shop mule for towing and pushing equipment or for shuttling boxcars in dock areas. The equipment was displayed recently by Great Lakes Tractor & Equipment Co., Birmingham, Mich., Dearborn distributors for Michigan.

Briggs Net Sets New High During Third Quarter

The Briggs Mfg. Co. set a new quarterly earnings record during the third quarter of this year with a net profit of \$6,157,058. Earnings for the first nine months of this year are reported as \$9,120,012, compared with \$7,412,597 during the same period of 1948.

Playboy Motors Future Dim As RFC Refuses Loan

Following the failure of a dealer group to come up with a tangible proposal for organization of the Playboy Motor Car Corp., a federal court in Buffalo early in November set Nov. 28 for a final hearing on the company's affairs. A spokesman for the dealer group said that the RFC had rejected application for a \$3.5 million loan. The company was put into federal court trusteeship last year, and the latest report of the trustees was that the company's liabilities were about \$2.4 million, with physical assets valued at \$50,000. Only a small number of hand-built cars was turned out by the enterprise.



EARTH MOVER

This new model UD rear dump Euclid is Euclid Road Machinery Co.'s latest addition to its line of earth-moving equipment. It has a payload capacity of 10 tons, a GVW of 40,850 lb, is powered by a 125 hp Diesel engine, and has a top speed with capacity payload of 35.7 mph.

NEWS of the AUTOMOTIVE INDUSTRIES

Corn Picker Sales in 1950 to be Four Times Prewar Level

Although the demand for corn pickers will decline considerably next year, 1950 sales will still exceed the prewar figure at least four times, the Commerce Dept. has predicted. One reason is that there are now some 430,000 machines in use or one for every 125 acres of corn grown. Another is that farm income in 1950 will be somewhat less than in 1949. Still a third fact is that there is little export market (800 annually) except in Canada. A Department survey places shipments in 1939 at about 14,000 machines and for 1949 at 96,000. But with current needs largely satisfied, a substantial portion of new demand will be for replacement purposes.

Globe-Union to Build New Plant in North Carolina

Globe-Union Inc., producer of replacement storage batteries, recently announced that Reidsville, N. C. had been selected as the location for its 14th factory.

Rolls-Royce First Car to Use Al-Fin Bonded Brake Drum

The British Al-Fin licensee, Wellworthy Piston Rings Ltd., Lymington, Hants, has obtained the first production order for passenger car bi-metallic bonded aluminum brake drums from Rolls-Royce for 5000 brake drums, the Al-Fin Div., Fairchild Engine and Airplane Corp., has reported.

Manufacturers Extending Oil Change Interval

There is a growing trend among automobile manufacturers toward the



EXPERIMENTAL THREE-EIGHTHS

This experimental styling model, which is three-eighths of life size, a product of the GM Styling Section, was on display during the Fisher Body Craftsman's Guild convention in Detroit, Mich.

2000 mile oil change. The number recommending that mileage between oil changes will be increased by at least five to a total of 11 when the 1950 models are announced, and another is expected to join the parade soon. Most of the companies involved are increasing the interval to 2000 miles from 1000 miles.

Kropp Forge Buys Stock of A. C. Woods

The Kropp Forge Co., Chicago, has purchased the entire capital stock of A. C. Woods and Co., Rockford, Ill., and is taking over the immediate operation of the plant as a division of Kropp Forge.

Second Round Price Rise Starts in Tire Industry

The expected second increase in tire prices has been touched off by Sieberling Rubber Co. The 3½ per cent increase announced Nov. 25 came within a month of the first increase by the same amount. An industry-wide price increase of about 3½ per cent on re-

placement truck tires and tubes was started Oct. 25 by Goodyear and was followed almost immediately by all other manufacturers. It is now believed that the tire industry will soon follow the Sieberling lead with another increase although it may not be as uniform as the first one.

No Deep Cuts Expected in Automobile Prices

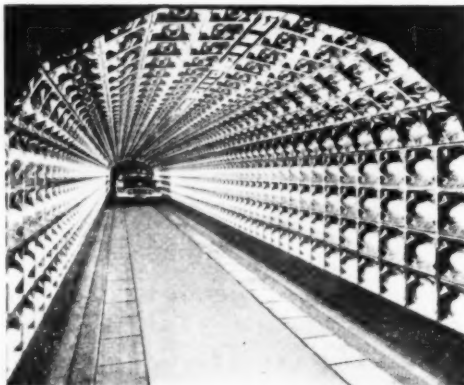
Current opinion in Detroit is that further reductions in automobile prices are not imminent, at least to any appreciable extent. Principal reason is that with increased labor costs in prospect because of the union pension drive, manufacturers will wait to see how they are affected before making any moves pricewise. Another factor is that steel prices will probably also feel the effect of increased labor costs, and may either go up or at least not be reduced as had been expected. Demand for automobiles has been holding up surprisingly well and there has been no great pressure for price reductions in most cases, but in the event the market should go soft this winter, it might force some reductions. In any case, however, the belief is that there is no room for large cuts and that they would probably range in the neighborhood of \$50 to \$75 a car.

Davis Sees 1949 Output As Record for Many Years

With the 1929 all-time production record finally surpassed after 20 years, a comment by J. R. Davis, Ford vice president in charge of sales and advertising is interesting. In a recent address he said that "I think we will probably be shooting at the 1949 production record for as long as or longer than we once aimed at breaking the 1929 record—which stood for 20 years." He thought that production next year would be less than the 1949 figure, probably as much as 10 per cent. He added, however, that output in 1950 could be

HOT SPOT

This new 1949 Oldsmobile is entering a tunnel of infra-red lamps in the new partially completed Oldsmobile final assembly plant. This is one of four specially built ovens used for drying the paint on all new Oldsmobiles assembled at the main plant in Lansing, Mich. A total of 1296 lamps of 250 w output heat the metal of the car to approximately 200 F.



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just as great as it will be this year if there are no major economic disturbances and if dealers do a real selling job.

New Material Studied for Convertible Tops

One manufacturer of high-priced automobiles is considering use of a new type material for convertible tops. It consists of a fibre glass fabric impregnated with a coat of vinyl plastic. It is reported that the material does not stretch and will not crack at low temperatures nor become tacky under heat.

Name Howard General Manager of Fairchild Aircraft Div.

Ben O. Howard has been appointed general manager of the Fairchild Aircraft Div., effective Jan. 1, according to Richard S. Boutelle, president, Fairchild Engine and Airplane Corp. Mr. Howard is now a director and consultant to the Consolidated Vultee Aircraft Corp.

Burnside to Head B-O-P Plant at Wilmington

Harlow D. Burnside has been made manager of the GM B-O-P assembly plant at Wilmington, Del. He succeeds Robert Ahlers who has been granted a leave of absence.

Tool Builders Make Apprentice Book Available to Public

The National Machine Tool Builders' Association has decided that its book on *Apprentice Training Standards* should be made available to industry in general, and not confined to member machine tool builders, it was recently announced by the Association. The book is a working manual for setting up and conducting an apprentice training course.

Ruthenburg Wins Award for Labor Relations

Louis Ruthenburg, board chairman of Servel, Inc., Evansville, Ind., has received the National Metals Trade Association award for outstanding achievement in industrial relations. He was presented with the citation at the Association's 50th anniversary convention in Chicago.

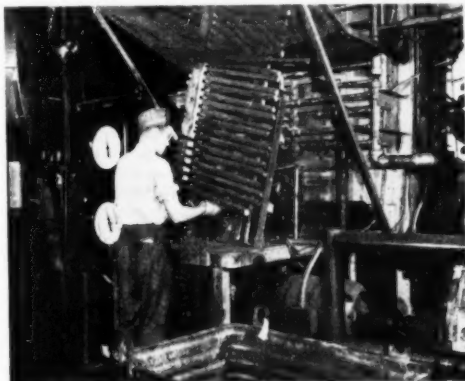
Replacement Needs Indicate Large Automobile Market

For several months there have been gloomy reports from dealers and others

that the automobile market would not take the sustained heavy production of new automobiles. Factory sales managers on the other hand definitely do not agree with that view and are constantly pointing out that the replacement needs of the country indicate a tremendous potential that can be reached by solid salesmanship. E. C. Quinn, Dodge general sales manager, is the latest to bolster his contention with statistics. He says that currently 45 per cent of all cars on the road today are eight years old or older, compared with 25 per cent in the prewar period. He stated further that 50 per cent of the 33 million passenger cars now in use in this country are eligible for replacement. Using BLS figures to support his contention that automobile prices are still low in relation to value of the dollar, he said that automobile prices increased only 87.7 per cent between August, 1939, and May of this

Banks Accept Financing of House Trailers

Banks are taking an active interest in financing house trailers on an extended basis, according to Don Zimmer, president of Zimmer Boat & Trailer Co., Detroit. He said that up until recently banks shied away from such financing, but are now offering extended payments up to three years and are currently working on a five-year plan. He said that annual production of house trailers now averages about 60,000 units, and that the biggest year on record was 1947 when 75,000 were built. This year it is expected that production will be about 50,000. The Zimmer company has recently completed a new modern plant on a six-acre site for production line manufacture of about 20 trailers a day. The company has just announced two new lines of trailers selling from \$2200 to \$4000.



SPACE CONSERVER

To conserve floor space in the axle shaft department of the Ford Canton Forge plant, a Selsas gas-fired furnace is mounted overhead and axle shafts are fed to it on the conveyor shown in this photo. The operator is loading shafts on the conveyor.

year, compared with an increase of 107.6 per cent in the price of all commodities. During the same period, he said, average weekly earnings in all manufacturing lines rose 123 per cent; farm production, 180 per cent; foods, 143 per cent; and raw materials, 149 per cent.

GM Spending \$60 Million for Engineering Annually

In view of attacks by government on big business it is interesting to note that GM spends about \$60 million a year in engineering and research. Only a large scale operation could support such a program with its obvious benefits to the public in developing better products and lower manufacturing costs. GM's expenditure for engineering and research is far greater than the entire net earnings of any of the independents.

Romney Employer Delegate at Metal Trades Meeting

George W. Romney, assistant to the president of Nash-Kelvinator Corp., will be the U. S. employer delegate representing automotive, appliance, and other consumer products manufacturers at the third Metal Trades Conference being held at Geneva, Switzerland, this month. H. V. Hadley, manager of the AMA Washington office, also is attending the conference as Mr. Romney's alternate.

Studebaker Sales Training Director Retires

David R. Osborne has retired as sales training director for Studebaker after nearly 23 years of service in that capacity.

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Foreign Automotive Tariffs

THOUGH small in dollar volume when compared with total export figures, foreign markets in 10 additional European and Latin American countries have been somewhat broadened by reciprocal trade agreements recently concluded at Annecy, France. In effect, the agreements worked out at Annecy bring the 10 nations within the trade program mapped out at Geneva in 1947. The new nations acceding to the Geneva pact are: Denmark, Dominican Republic, Finland, Greece, Haiti, Italy, Liberia, Nicaragua, Sweden, and Uruguay.

Beyond automatically extending the concessions granted at Geneva to the above nations, few new tariff cuts were made which would affect the industry. These were along such lines as certain types of engines, parts such as bearings, etc. (see table).

In 1948, the United States imported a total of \$382 million worth of products from these 10 nations. Of the total, nearly half or about \$183 million worth were duty free. As a result of the Annecy meetings, improved customs treatment, either through binding or reductions in duties, was granted by the U. S. on an additional \$143 million worth.

Major concessions granted the United States in return for the latter's favorable treatment include the following of interest to automobile, aviation and related industries:

Automobiles and Parts

Sweden reduced to 15 per cent the duty on passenger automobiles, except buses, of the types in which the United States has the chief interest, and on chassis for automobiles, including trucks. The present 15 per cent rate on parts for replacement was bound, and the rate on parts for assembly was reduced to 12 per cent. Outboard motors were bound at 10 per cent.

Denmark reduced the compound duty on larger passenger cars to 15 per cent ad valorem by the elimination of the specific element, and bound favorable rates on a wide range of automotive parts. It also bound

at 7½ per cent the duty on magnetos, generators, electric motors, and certain other electrical equipment for automobiles. The five per cent rate on automobile engines was likewise bound and parts for such engines were assured a ceiling of five per cent.

Finland conceded 14 per cent rates on passenger cars of the types of chief interest to the United States, and on trucks, buses, automobile chassis, and most automotive parts. A 15 per cent rate was obtained on electrical equipment for automobiles except ignition systems. Truck tractors and industrial trucks will benefit from a 10 per cent rate.

Italy granted substantial reductions from the 1938 tariff level on passenger cars, trucks, and many automotive parts. The new rates range between 25 and 40 per cent. Motorcycles (heavier models) will enter at 30 per cent as against the 60 percent rate provided in the new tariff.

Greece changed the duties on most automotive items from a specific to an ad valorem basis, and granted substantial duty reductions on lower-priced passenger cars, and moderate reductions on parts. Bindings of duties were

conceded on other automotive vehicles. Trucks and trailers will enter at three per cent and chassis at six per cent.

Liberia bound a 10 per cent ad valorem rate on passenger vehicles, trucks, trailer, parts, and accessories.

Haiti reduced the duty on passenger buses by a third; bound the rate on trucks, automotive parts, and accessories including batteries; and divided the classification of passenger automobiles into three parts with duties ranging between 13 and 22 per cent.

The Dominican Republic bound the existing duty of 15 per cent on spare parts for trucks, passenger cars, Jeeps, and buses, including engines.

Nicaragua agreed to establish ad valorem ceilings on most passenger cars ranging from 14 per cent to 25 per cent, and on trucks, a top limit of 10 per cent. All of these automotive vehicles have been entering

Tariff Conference Next Year

WASHINGTON—Under authority of the recently extended trade agreements act, the White House and State Department are making arrangements for a third round of tariff slashes in a move to reduce dollar shortages of other nations.

Arrangements are already under way by the State Dept. for a conference to be held next September at a site to be decided early next year. In attendance will be the 32 nations which are already parties to the general agreement negotiated at Geneva in 1947 and at Annecy in 1949. In addition, the Department is sounding out various other nations as to their views, hoping to get them to take part in the 1950 conference and accede to the general agreement.

Lowered by Annecy Agreements

By Karl Rannells

Washington Bureau
AUTOMOTIVE INDUSTRIES

Agricultural Machinery, Implements, and Tractors

Sweden bound a 10 per cent duty on tractors, and reduced duties on harvesting machines, plows, harrows, and similar implements.

Finland established a 10 per cent rate on plows of types manufactured locally and accorded duty-free treatment on other types. The rate on tractors was set at eight per cent.

Italy established a 25 per cent rate on heavy track-laying tractors, and an 18 per cent rate on machines for preparing the soil, except plows.

Greece established a duty of three per cent ad valorem on agricultural machinery and tractors, including plows, reapers, harrows, harvesters, irrigation pumps, etc.

Liberia bound the existing duty-free treatment on agricultural tools, and placed upon the free list agricultural machinery, appliances, and parts.

Haiti bound the present duty-free treatment on

(Turn to page 68, please)

duty free since 1948 under temporary legislation; the concessions obtained are assured until Dec. 31, 1950.

Uruguay made some adjustments in its moderate duties on passenger automobiles which are levied on a sliding scale, the rate increasing in each ascending weight group. A small reduction in the rate was obtained on cars in the group of primary importance to the United States and on one other group. A small compensating increase was accepted on one group, and duties were bound on the remaining groups. Uruguay also bound against increase existing rates on chassis for passenger cars, trucks, and buses, on drivers' cabs for trucks, on trailers, and on over 35 tariff classifications covering most automobile parts for replacement and assembly, including engine parts.

Aircraft and Parts

Sweden bound a 15 per cent duty on aircraft with engines.

Denmark bound a 7½ per cent rate on aircraft except those used in international traffic, which were bound free. Similarly, engines and parts and aluminum parts for aircraft were bound either free or at low rates.

Finland will continue to grant duty-free treatment of airplane engines for installation in aircraft for specific uses or of a type not manufactured domestically.

Nicaragua bound free of duty aircraft for public service.

Uruguay also bound on the free list: airplanes, parts for replacement or assembly of aircraft, and light aircraft engines and parts including electrical apparatus.

Major Items Relating to the Automotive and Machinery Industries on Which U. S. Concessions Were Made at Annecy Conference

Paragraph of 1930 Tar. Act	Commodity Description	Original Negotiating Country	Rates of United States Duty	
			Before Annecy Agreement	Under Annecy Agreement
304 thru 319	Varied types of steel products.....	Sweden	Varied	Generally cut half existing rates.
321	Anti-friction balls and rollers, metal balls and rollers commonly used in ball or roller bearings. Metal ball or roller bearings and parts thereof (except balls and rollers).	Sweden	4¢ lb. + 25% or 8¢ lb. + 35%	4¢ lb. + 12½%
328	Iron or steel tubes for manufacturing ball or roller bearings. Tubes of iron or steel, n.s.p.f.	Sweden	25%	17½%
	Tanks, or vessels, cylindrical or tubular, for holding gas, liquids, or other ma- terial.	Sweden Greece	25% 25%	12½% 12½%
353	Articles having as an essential feature an electrical element or device, and parts thereof, finished or unfinished, wholly or in chief value of metal, n.s.p.f.: Internal-combustion engines, other than carburetor type, if of the horizontal type and weighing over 5000 lb. each, and parts thereof.	Denmark	38%	17½%
	Internal-combustion engines, other than carburetor type, and not of the horizontal type, weighing over 2500 lb. each, and parts thereof.	Denmark	38%	17½%
372	Internal-combustion engines, other than carburetor type, if of the horizontal type and weighing over 5000 lb. each and parts thereof.	Denmark	27½%	17½%
	Internal-combustion engines, other than carburetor type and not of the hori- zontal type, weighing over 2500 lb. each, and parts thereof.	Denmark	27½%	17½%

Source: Protocol of Accession and Schedule negotiated at Annecy, France, April-Aug. 1949.—State Dept.
Note: Third paragraph of the above table indicates the nation with which the United States negotiated the tariff
agreement. However, with few exceptions, all such benefits must be extended to all countries taking part
in the Geneva and Annecy reciprocal tariff pacts.

FEATURED during the joint SAE panel of the National Diesel Engine and National Fuels and Lubricants meetings, held during the first week of November in St. Louis, was a talk by Charles F. Kettering, a director of General Motors Corp., on internal combustion engine problems, much of which was devoted to the Diesel engine. As to the availability of petroleum, he scoffed at the often expressed fear that this country would find itself running out of fuel and cited the statistics on which these fears are based, pointing out that in the last few years, during which Diesels have only begun to win general acceptance, fuel consumption has increased 600 per cent, but Diesels still use less than one per cent of the oil produced.

Each meeting also had its own technical sessions at which a number of timely papers were presented by engineers. In the paper, "Automatic Transmission Fluid, Type A, for Passenger Cars," by H. R. Wolf, of the Research Laboratories Div. of General Motors, and J. L. McCloud, of the Ford Motor Co., the authors estimated that at present there are more than 1,500,000 automatic transmissions in service and predicted that the upward trend of automatic devices would continue. It was announced that a number of petroleum refiners are developing Type A fluids that should be in commercial production early in 1950. These fluids need not be compounded on the same formulation, it was pointed out, but they must provide minimum performance characteristics for service operation, which include:

Complete miscibility (or "mixability"), maximum resistance to oxidation, operation over a maximum temperature range, minimum volatility, minimum anti-foam characteristics, maximum protection against corrosion and rusting of component parts, minimum effect on seals, freedom from squawking or chatter in units where a change in ratio is made under engine power and freedom from toxic properties.

Under the General Motors program the refiners submit their fluids to the Armour Research Foundation for preliminary laboratory tests and later service tests are made on the GM Proving Ground before a fluid is qualified.

"Some time will be required by the petroleum industry to develop and qualify the modified Type A fluids," the SAE meeting was informed. "During this interim period, until distribution can be established and a complete

changeover can be made to the modified product, arrangements have been made whereby petroleum refiners and marketers may qualify current production fluids for resale under their own brand or trade name."

Selected from the papers are the following abstracts:

Oil Ring Plugging—A Missing Link in Laboratory Tests

by L. J. Test,
Atlantic Refining Co.,
and C. A. Hall,
Ethyl Corp.

OIL-RING plugging, a missing link in present standardized laboratory tests, is believed to be one of the most significant factors in the engine cleanliness problem because of its adverse effects on oil consumption in engines. For evaluating oil-ring plugging factors in the laboratory, test procedures have been developed using a multicylinder engine, a single-cyl CFR engine, and a single-cyl Lauson LF engine.

The first step in the laboratory was to improve on the available visual method of rating oil-ring plugging. To solve this problem, an oil-ring rater was designed and developed by the Atlantic Refining Co. This rater consists essentially of a cylindrical base which supports an indexing turret containing the oil ring. The base also contains a photoelectric cell, and a projection-type light bulb centered within the oil ring and turret. Light from the bulb passes through a given slot in the oil ring

through a somewhat larger slot in the base, and is picked up by the photoelectric cell. The amount of light reaching the photoelectric cell is inversely proportional to the amount of plugging in the ring slot. The turret is indexed so that a light-meter reading can be readily obtained. A small electric motor is geared to the turret and continuously rotates it and the oil ring, so that an average reading of the amount of light passing through all the slots is thus obtained in only one observation. For rating purposes, a plugged-ring reading is compared with the reading obtained with that of a standard clean ring so the per cent of plugging can be calculated. It should be pointed out that this rater evaluates ring plugging in terms of minimum unblocked cross-sectional area of the slots rather than in terms of total amount of deposits in these slots. The rater has been found to be accurate within about ± 2.5 per cent when used to rate rings whose slot areas were blocked off by known amounts.

Laboratory-engine tests of the type shown in Table 1 were used for determining the relative oil-ring plugging tendencies of various gasolines. Variations in ring-plugging characteristics encountered with a series of gasolines evaluated in the Lauson LF and multi-

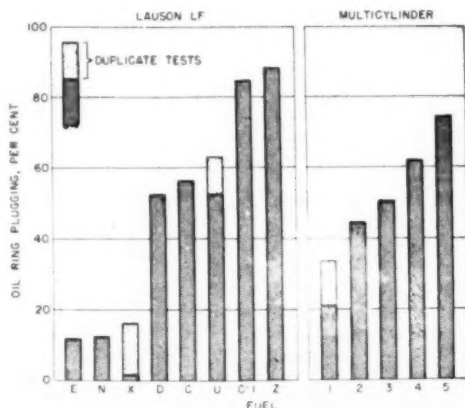


Fig. 1—Effect of different fuels on oil-ring plugging as evaluated by laboratory test procedures.

Discussed at

National Meetings

Table 1. Oil-Ring Plugging Procedure for Lauson LF Engine

Cycle	120 Hours Test Duration	
	2 Hr at Idle	4 Hr at High Speed
Load Speed	None 600	Full Throttle 2000
Air-Fuel Ratio	9.5 ± .5	14.5 ± .5
Jacket Water Temp., F		
Outlet	90 ± 3	200 ± 5
Inlet	75 ± 3	165 ± 5
Carburetor Air Temp., F	170 ± 5	Ambient
Oil Sump Temp., F	150 ± 3	150 ± 3
Ignition Timing, degrees btdc	22	22
Oil Sump Charge, ml		500
Gasoline required per test, gal		30

cylinder engine procedures are presented in Fig. 1. All tests with a given procedure were run with the same lubricating oil, and all of the fuels contained approximately 1.0 ml tel per gal. The cross-hatched portion of the vertical bars represents differences between duplicate tests on the same fuel. These data show that fuels can vary considerably in their tendencies to plug oil rings. For example, in the Lauson LF procedure fuels E and Z varied from 12 to 88 per cent in their ring-plugging tendencies. Considerable variation can also be observed between five fuels in another group rated by the multicylinder engine procedure.

Laboratory Wear Tests With Automotive Gear Lubricants

by S. A. McKee,
J. F. Swindells,
H. S. White,
and W. Mountjoy.

National Bureau of Standards

OF the various laboratory testing machines that have been commonly used in the study of automotive gear lubricants, the SAE machine, in general, most nearly simulates gear operation. The two contacting cylindrical test cups of this machine are rotated at different speeds under load, and provide a combined rubbing and rolling action that is typical of loaded gear teeth. A further similarity is a line contact which is constantly changing with respect to the surface of both

cups, hence no one point on the periphery is under continuous stress.

This paper describes the use of the machine for the determination of the wear with gear lubricants under conditions simulating high torque and low speed.

The machine is particularly adaptable for wear tests in that the test specimens are of such size and shape that accurate indications of wear may be obtained by determinations of loss in weight.

In order to perform this test, however, it was necessary to modify the machine for long-time operation and better temperature control of the upper test cup.

The lubricants used in these tests included a Navy Contract 1080 mineral oil, five lubricants conforming to U. S. Army Specification 2-105B, five lubricants conforming to Federal Specification VV-L-761, and one lead-soap active-sulfur lubricant. All were SAE 90 grade. In the figures given in this paper the mineral oil is designated by the number "1080," the Army Specification lubricants by the letter "A" and a number representing a particular lubricant, the Federal Specification lubricants by the letter "F" and the lubricant number, and the lead-soap active-sulfur lubricant by the letters "AS."

In all the tests, the upper test cup was driven at a speed of 500 rpm with a 3.4 to 1 gear ratio between the upper and lower cups. This provided a 2.4 to 1 ratio of rubbing to rolling at the

contacting surfaces. The specimens used were steel Timken test cups T-48651 and in most of the tests had an average surface roughness of from 25 to 30 microinches rms, Profilometer. A two qt sample of oil was used in each run. This was circulated at a rate of about 500 gpm. Using a constant oil temperature of 225 F, tests were made at constant loads of 90, 135, 180, and 225 lb (scale readings) respectively.

The test cups were weighed before and after each period of operation during a test, the loss in weight being used as a measure of wear during the period.

The effects of these tests are summarized in Table 2 which gives the values of the rate of wear expressed in mg per hr for each lubricant at each operating condition. These values are based on the slopes of the straight portion of the curves. When operating at 225 F with a 90-lb load, the rate of wear with all the lubricants is relatively low. At the 135-lb load, however, the wear with the lead-soap active-sulfur lubricant and two of the Federal Specification lubricants has definitely increased. These differences become accentuated at the two higher loads. At 180 lb the wear was excessive with the active-sulfur lubricant and with four of the Federal Specification lubricants. At 225 lb, the wear was relatively low

Table 2. Summary of Wear Data

Lubricant	Rate of wear after run-in period mg per hr at				
	225 F				250 F
	90 lb.	135 lb.	180 lb.	225 lb.	180 lb.
1080	0.2 (0.1)	0.1 (0.1)	0.2 (0.2)	scuffed	0.2
A5	0.2	25	120	440	400
A1	0.1	0.2	0.3	0.2	0.2
A2	0.4	0.4	0.3	0.2	0.4
A3	0.6	0.7	0.8	0.2	0.6
A4	0.2 (0.3)	0.7	0.2	140	0.3
A5	0.1	0.4	3.7 (4.7)	9.9	9.0
F1	0.2	0.2	260	240	260
F2	0.2	1.3	190	215	200
F3	1.0	4.6 (2.5)	5.2	9.7	4.5
F4	0.8	8.7	21 (24)	24*	10
F5	0.1	0.3	220	580	550

* Test cup broke; first run at 17 hrs.; check run at 7½ hrs.

with three Army Specification lubricants, moderate with one Army and one Federal lubricant, excessive with four Federal, one Army, and the active-sulfur lubricant, and seuffing occurred with the mineral oil.

Duplicate runs were not made with all the lubricants under all operating conditions. However, the results of check runs under some conditions are given in parentheses in Table 1. These indicate that the results are reproducible within practicable limits.

Values of the rate of wear obtained in the tests with all the lubricants operating at the 180-lb load and 250 F are also given in Table 1. These data show no marked difference from the data obtained at 225 F with the same load.

The lubricants containing the more chemically active additives for withstanding higher shock load tend to show the greater wear. This is in agreement with the known service performance of some of these lubricants, particularly the active-sulfur lubricant and the non-additive mineral oil.

The Composition of Diesel Exhaust Gas

by Martin A. Elliott
and Rogers F. Davis,
Bureau of Mines

THE desirability of eliminating or minimizing the odor from Diesel exhaust gases became apparent in connection with the Bureau of Mines field studies on the use of Diesel engines underground. In one underground application of Diesel engines on which detailed data are available, the characteristic odor of Diesel exhaust gas was evident, even though aldehydes, which are generally regarded as responsible for the odor, were present in the air only in extremely low concentrations.

The effect of aldehyde concentration on the odorous and irritating properties

of Diesel exhaust gas is shown in Fig. 2. From these results, it was concluded that the concentration of aldehydes could be used as a satisfactory criterion of odor and that the most promising method for eliminating odor would involve removing aldehydes from the exhaust gas.

The use of water as a scrubbing medium for removing aldehydes from Diesel exhaust gas has been mentioned frequently in both the technical and trade literature. Theoretical considerations indicate that incomplete removal of aldehydes is likely unless the gas is scrubbed countercurrently with fresh water containing no dissolved aldehydes. Such a scrubbing system is not feasible for mobile Diesel-powered equipment. Even though scrubbing

with water did not appear to be attractive, it was considered advisable to obtain quantitative data on the limitations of water as a scrubbing medium for removing aldehydes from Diesel exhaust gases.

In making a test, the conditions were adjusted during the first four hours of operation. These conditions were then maintained for the duration of the test (approximately six hours). During the test period the water lost from the scrubber in saturating the exhaust gases was replenished by fresh water to maintain approximately 10 gal of water in the scrubber at all times. Samples of the exhaust gas at the inlet and outlet of the scrubber were taken at intervals during the test.

The results of the tests clearly indicated the unsuitability of water as a scrubbing medium, since the removal of aldehydes decreases rapidly with increasing concentration of dissolved aldehydes particularly at elevated temperatures. Increases in the concentration of dissolved aldehydes in the scrubbing water are inevitable in mobile Diesel powered equipment because of limitations in water carrying capacity.

In view of the foregoing results, other means for removing aldehydes were sought, laboratory studies showed that aqueous solutions of sodium sulfite inhibited by the addition of hydroquinone offered the greatest promise. The addition of hydroquinone is necessary to retard oxidation of the sodium sulfite by the residual oxygen in the Diesel exhaust gas.

The results of full-scale tests made with a scrubbing solution containing 10 per cent by weight of sodium sulfite and 0.0, 0.2, and 0.5 per cent by weight of hydroquinone are shown in Fig. 3. The scrubbing solution, approximately 10 gal, containing 0.5 per cent hydroqui-

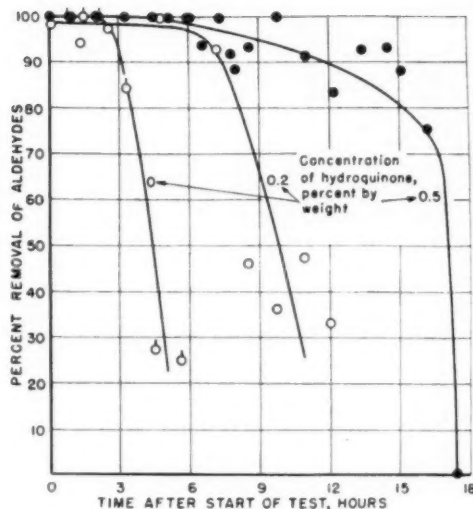


Fig. 3—Per cent removal of aldehydes from Diesel exhaust gas by scrubbing with a solution of sodium sulfite and hydroquinone.

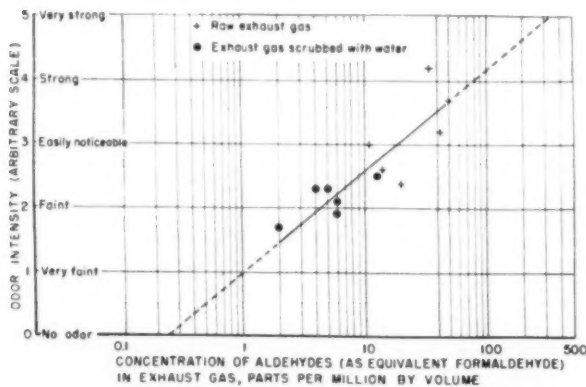


Fig. 2—Effect of aldehyde concentration in Diesel exhaust gas on odor. Each point represents an average of the impression of five to 10 individuals.

none removed more than 90 per cent of the aldehydes for approximately 12 hours at a scrubbing temperature of 133 F. During this period approximately 45,000 cu ft of dry exhaust gas, at 60 F and 29.92 in. Hg, containing an average of about 15 parts per million of aldehydes were scrubbed. If it is assumed that an engine produces an average of 5000 cu ft of dry exhaust gas (at 60 F and 29.92 in. Hg) per hour and operates continuously for eight hours per day, the daily cost for scrubbing chemicals would be \$0.80. This estimate is only approximate, but it indicates the low order of magnitude of the cost of removing aldehydes from Diesel exhaust gas. From the results of the tests and from the cost estimates, it appears that scrubbing Diesel exhaust with inhibited sodium sulfite solutions is an effective and economical method for removing aldehydes from Diesel exhaust gases.

In connection with scrubbing Diesel exhaust gases the loss of water by evaporation is an important consideration. For example, with exhaust gas temperatures of 200 F and 800 F, the loss of water is respectively 5.7 and 18 lb per 1000 cu ft of dry exhaust gas at 29.92 in. of Hg and 60 F. If we assume an average loss of 12 lb per 1000 cu ft of dry exhaust gas, then in the example cited, approximately 65 gal of make-up water would be required in an eight hour shift.

Light Engine Oils For Improved Sub-Zero Operation

by V. G. Raviolo,
Ford Motor Co.

THE Fuels and Lubricants Technical Committee of SAE decided, on the recommendation of Sub-committee B, that a classification of oil lighter than SAE 10 was worth considering in order to improve cold starting. It was felt that test data were required on this oil, tentatively called 5W, in order to evaluate the improvement in cold starting to see if it was enough to justify a new grade.

Cold starting tests were run by four of the cooperating laboratories. The bulk of the data was obtained using the research oils, but the methods of test and the temperatures used varied among the four laboratories. In each case a legitimate comparison is possible between the 5W and 10W oils, since the variables were constant for any one laboratory.

Viscosity in the engine varies with the oil used, the amount of dilution in the crankcase, and the ambient temperature. Cranking speed varies as a function of viscosity, engine design variables, and the condition of the electrical starting system. Starting time, that is time to first fire and time to run, varies with cranking speed, engine design variables, ambient temperature, humidity, and fuel characteristics. An

attempt was made to analyze the time-to-first-fire and the time-to-run data, but because of the complexity of the variables involved it was found impossible to establish a correlation. It was therefore necessary to use the cranking speed data for the comparison of cold starting with 5W and 10W oils.

Three of the laboratories reported the results of tests where the engines were operated in pairs of identical schedules. These results permitted direct comparison. The fourth laboratory reported the results of tests where three vehicles were run on each oil at random temperatures. These data on cranking speed vs. temperature were plotted in pairs and the difference in cranking speed was determined at the average temperature by interpolation.

A summary of the cranking speed data is shown in Table 3. All labora-

Table 3—Cranking Speed Data

Oil	No. Starts	Average Rpm	Average Temp.	% Increase
10W	33	53	-11.3	26.4
5W	37	67		
10W	5	88	+ 8.8	24
5W	5	109		
10W	5	86	+ 8.8	29
5W	5	111		
10W	5	84	+ 8.8	32
5W	5	111		
10W	3	38	-24	58
5W	3	57		
10W	7	41	-23	16
5W	10	47		
10W	7	44	-13.1	32
5W	16	67		
10W	7	83	-14.0	33
5W	16	84		

tories showed an improvement in cranking speed for the 5W oils when they were compared with 10W oils at a given temperature. The increase varied from a low of 15 per cent to a high of 58 per cent. It is significant to note here that the individual tests from which these averages were compiled showed an increase in cranking speed without exception. The average cranking speed with 10W was 62 rpm and the average cranking speed with 5W was 82 rpm, in increase of 33 1/3 per cent.

The character of the tests and of the derived data is such that temperature advantage is difficult to show directly. Past experience and tests have shown that in absence of other variables cranking speed varies as viscosity. Extrapolation according to this relationship agrees substantially with the individual test data which can be compared. Reference to the viscosity-temperature characteristics of the subject oils indicate that the 33 per cent improvement in cranking speed is equivalent to a temperature advantage of 15 F for the same cranking speed. While this cannot be taken as a direct measure of starting ability, since bat-

tery voltage and fuel distribution also deteriorate at variable rates with lowered temperature, it does indicate the general magnitude of the improvement.

The ability to continue to run after first fire has been noted by several observers to be improved with 5W, minimizing the tendency to stall with the heavier oils. Experience in the Canadian areas, reported by the marketers, shows that this improved starting ability is one of the most widely noted and appreciated characteristics of 5W oil.

The Diesel Engine Cold Starting Problem

by F. L. Nelson
and C. J. Ulzheimer,
Socony-Vacuum Oil Co.

IN contrast to the lack of published information on such factors as engine design features, the effect of fuel factors on cold starting has been studied extensively with the general realization that inherent shortcomings exist. It is the main purpose of this paper to point out the extent of the help which can be expected from the fuel supplier. Assistance from this source could conceivably stem from improved fuel ignition quality, volatility, viscosity, and pour characteristics, fuel additives, and priming fluids. The current status of the problem is summarized in the following paragraphs.

Starting accessories such as glow plugs, jacket heaters, flame primers, etc., are acceptable for some specific applications; however, it is felt that there is room for improvement in all of them with regard to reliability, ease of use, or cost.

Diesel engine cold starting does not respond significantly to improvements in cetane number obtained by the use of presently known ignition accelerators. Due to the fact that engines of current design likewise do not respond to increases in natural cetane number above the range of 55 to 60, it is not attractive to the refiner to invest in further research along the line of improving cetane number for cold starting purposes either by way of fuel treating, synthesis or additives.

It is felt that engine builders might contribute much by investigating the effect of injection and combustion chamber design on cold starting.

With present combinations of fuels and engines, the most effective and potentially the most convenient method of assisting Diesel starting is by means of a priming fluid. Of these fluids, diethyl ether is by far the most effective, cheapest and widely distributed. It is not believed that further search for a better fluid is warranted. It is felt, however, that due to possible hazards in the use of ether, the promotion of its use should originate with the engine builder, with each builder recommending the priming procedure for his particular engines.

Second Paris Show Necessary for Trucks

More Extensive Use of Diesels, Underfloor and Rear Mounted
Engines, and Single Tires Taking Place of Duals Feature
Commercial Vehicle Exposition in Grand Palais

CONNECTED with the French automobile industry as its exhibit facility for more than 40 years, the Paris Grand Palais is now too small for the needs of the whole of the automotive industries. Consequently, two shows were held this year. At the passenger car show in October (see Nov. 15 issue AI) truck chassis were admitted, while in the second show for commercial vehicles that followed, space was shared with motorcycles and bicycles.

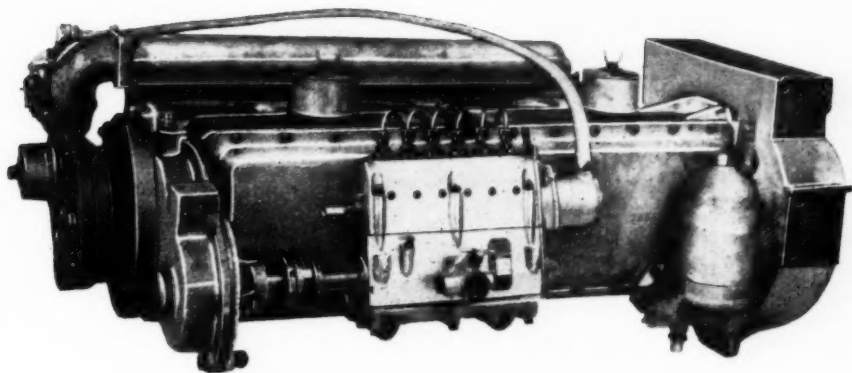
Outstanding features of the truck show were more extended use of Diesels which are used practically 100 per cent for all loads above 5000 lb. frameless construction of coaches and buses, underfloor and rear

engines, improved suspensions, and greater use of single tires in place of the duals which have been common in Europe for a number of years.

Berliet has produced a five cyl Diesel, the only one with this number of cylinders built in France, of 4.69 in. by 5.46 in. bore and stroke, developing 110 hp. Produced under Ricardo license, the engine is an overhead valve type, with Pintaux injectors, a belt-driven air compressor, and a separate transmission. This transmission gives five speeds ahead, the fifth being an overdrive. In the truck chassis load capacity is seven tons, with the ability to haul a five ton trailer. The same engine is used in a bus chassis, with an inclined two-piece driveshaft and an offset differential.



Renault 50-passenger bus with under-floor engine.



Renault under-floor Diesel engine designed for bus service.

In this chassis the transmission is a unit with the engine and with overdrive the road speed is 47 mph.

M.A.P. (Manufacture d'Armes de Paris) presented a two and a four-cyl opposed piston two-stroke Diesel of unusual design. Both engines have a bore of 3.43 in. and a stroke of 4 in. The output of the four cyl engine is 120 hp at 2000 rpm and complete weight approximately 1220 lb with electric starter, governor and flywheel. Compactness is a distinctive feature of this engine, length being 38 in., width 26 in. and height 29 in. The main casting of the engine carries parallel cylinder barrels, receiving the opposed pistons. One piston uncovers the inlet ports and the other the exhaust ports, and injection takes place in the chamber formed by the two piston heads. The crankshaft, carried below the cylinders, has three roller bearings, with plain bearings for the connecting rods. Each piston pin is connected by a very short rod to a rocker beam, the opposite end of which is connected by the main connecting rod to the crankshaft. Pistons have steel heads and light alloy skirts. A low-pressure Roots type blower delivers air at a pressure of five psi into an intermediate chamber, from which it goes to the combustion chambers.

The MAP engines have been used most extensively for tractor service, but other applications are marine and industrial. As a demonstration, one of the four cyl engines was fitted in a Delahaye chassis and broke world's 12-hr Diesel records, on Montlhery track, at an average of 109 mph and a speed of 113 mph for one hour.

Aries displayed a four-cyl opposed aircooled Diesel, developing 30-40 hp at 1500 to 2000 rpm. It had valves in the head, with cooling by means of a turbine driven from a vertical shaft on the top of the crankcase, the air being drawn in vertically, ducted around the cylinder barrels and discharged laterally. This appeared to be a prototype which is not yet in production and details were not available.

Renault has produced a 50 passenger frameless coach with under-floor engine. The frame-body construction is square section tubes with steel paneling. The flat engine is mounted centrally and is a six-cyl horizontal Diesel of 4.13 in. by 4.72 in. more and stroke with valves in head and direct injection. The transmission, which is separate, provides five forward speeds, the drive to the rear axle being double reduction giving a total reduction of 7.08 to one. Wheelbase is 220 in. and overall length 418 in. The semi-elliptic springs front and rear are supplemented by inclined coil springs on the Gregoire system, automatically providing a variable degree of flexibility.

Using the Renault construction, the Scemia Co. has two types of bodies designed for French service after observation of American practice. One of these is a two-man bus, with a big rear platform and a single step, to assure quick access, and two exits, one at the center and the other at the front. This provides 31

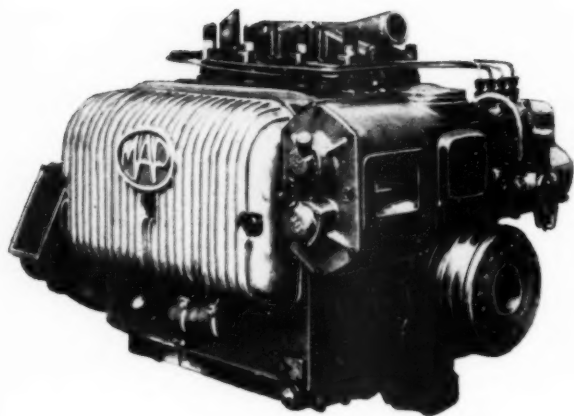
seats with space for 40 standing passengers and obviously has been designed for Paris conditions, where quick loading and unloading are important factors. The second vehicle is designed for driver and conductor at peak hours and driver only under light conditions. When converted

for pay-as-you-enter, the conductor controls are abolished and his seat becomes available for a passenger. The new vehicle, either as equipped by Scemia, or in the original Renault condition, is mounted on single rear tires, whereas in the past buses of this capacity have been fitted with dual tires at the rear.

Hispano-Suiza is getting into construction, under license, of the flat Hercules six cylinder engine of 140 hp. A complete vehicle will not be built, but the engine will be supplied separately and doubtless will meet the requirements of firms producing coaches to their own designs and taking mechanical units from specialists. These constituted one of the features of the Paris Salon.

By W. F. Bradley

*Special European Correspondent
for AUTOMOTIVE INDUSTRIES*

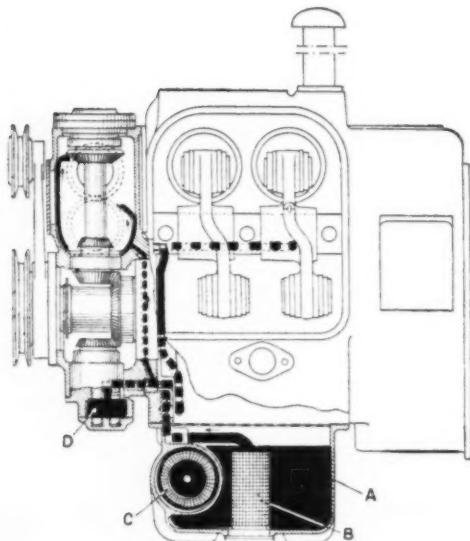


MAP four-cyl opposed piston, two stroke Diesel engine.

Isobloc continues a frame-body construction with a vertical rear mounted engine. Another rear engine vehicle was the Savia, with a 40 passenger coach driven by a transversely mounted six cyl Saurer engine. Million-Guiet-Tubauto offered frameless construction, in this case with a six cyl Somua Diesel in front, driving through a Cotal electro-magnetic planetary transmission.

Largest of the frameless coach constructors in

(Below) This partly cut away drawing shows part of the oiling system and accessory drive mechanism of the MAP two stroke Diesel engine. A—oil sump; B—oil intake screen; C—oil filter; D—oil pump.



France is Chausson with an all-steel welded body. In all cases the engine is in front, by the side of the driver, with front entrance and rear exit, but there are variations in the mechanical units, the engine being gasoline type of four or six cyl, or four or six cyl Diesel. The Paris Bus Co., which intends to renew its entire fleet of 2000 vehicles during the next four years, is experimenting with Chaussons, fitted with a 120-hp Somua Diesel, hydraulic clutch, and Wilson planetary transmission. It is a single decker and has single rear tires.

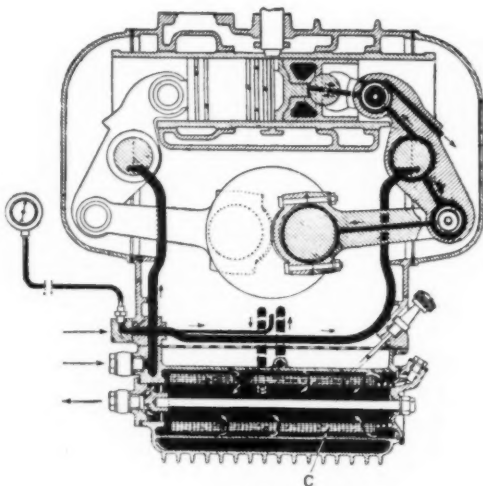
While embodying much detail individuality, body styling for interurban and sightseeing coaches followed the same general lines: full fronted, whether the engine was forward, under-the-floor or at the rear, sloping and rounded windshield; entrance by jack-knife door at the front and exit at the rear; and luggage carrier on the roof, with access

to it by a rear ladder.

Only one semi-trailer coach was shown. This had a Rochet-Schneider tractor and the trailer provided for 56 seated passengers, having rear entrance, central aisle, and seats in pairs on each side.

To bring modern equipment to the attention of persons in the devastated regions of France, the united light-alloy industries presented the Roche road train, composed of a Panhard tractor and a 46-ft semi-trailer built entirely in light alloy. The chassis only weighed 990 lb and the complete trailer scaled just under 5 tons.

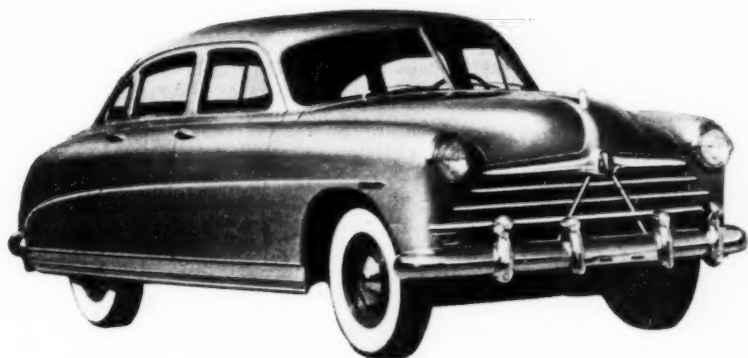
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(Above) This sectional illustration shows the arrangement of connecting rods, pistons, ports, etc., as well as part of the oiling system of the opposed piston, two stroke MAP engine.

Smaller, Lower-Priced Hudson

By Joseph Geschelin



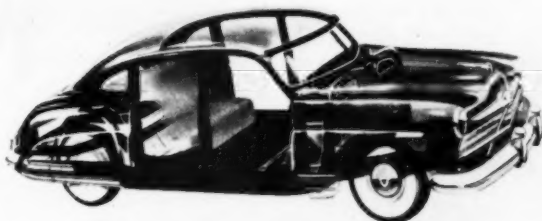
The model 500 has the same length body as Hudson's larger 490 models while front fenders and hood are shorter. The new model retains many of the features of the current Hudson lines.

New Model Has Shorter Wheelbase and Overall Length. Six Cylinder Engine Has a Piston Displacement of 232 cu. in. and Develops 112 Hp. Basic Structure and Size of Body Remain Unchanged.

DETAILS of the long awaited announcement of a lower-priced Hudson line released recently reveal that the Model 500 Pacemaker retains all of the characteristic styling and eye appeal of current Hudson cars. The basic dimensional change is in wheelbase which is 119 $\frac{7}{8}$ in. as compared with 123 $\frac{7}{8}$ in., a reduction of four in. This has brought with it a correspondingly shorter hood, shorter front fenders, and a reduction in overall length.

In making this change, Hudson was enabled to take full advantage of its unique body construction. By leaving the basic structure unchanged from the cowl to the rear end, body fabrication is exactly the same as standard. The forward section of the unit body and frame, it will be remembered, consists of a separate front frame section. This is made correspondingly shorter for the Model 500 without affecting assembly procedures. The only additional sheet metal change required for this model is a dash panel with a depression at the center to permit clearance for the power-plant.

Mechanically the new model retains many of the



Basic body structure remains unchanged. The separate front frame section has been made shorter and a depression provided in the dash panel to permit clearance for the engine.

same features that are embodied in the current lines.

One of the features of this model is its six cyl 112 hp L-head engine. It has a bore of 39/16 in. and a stroke of 3 $\frac{3}{4}$ in. with a displacement of 232 cu in. This compares with a displacement of 262 cu in. in the six cyl engine used in the 490 models. Standard compression ratio is 6.70 to 1. With a high-compression aluminum head the compression ratio is 7.20 to 1.

CONDENSED SPECIFICATIONS

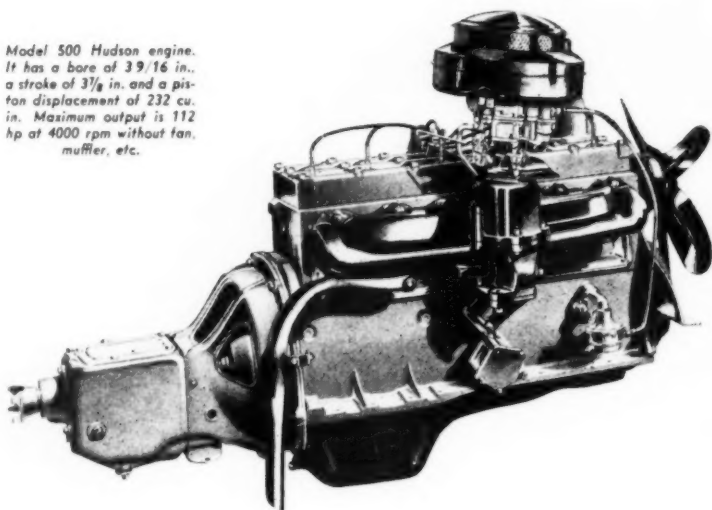
Hudson Model 500 L-Head Six-Cylinder Engine

Bore (in.)	3 9/16
Stroke (in.)	3 7/8
Displacement (cu. in.)	232
Bhp. (max.) (bare engine)	112 @ 4000 rpm
Torque (lb ft.) (max.)	165 @ 1600 rpm
Compression ratio:	
Standard	6.7 to 1
Optional (with aluminum head)	7.2 to 1
No. main bearings	4

The valve mechanism is the same as on the larger Six but the carburetor is different, the new engine taking a single throat 1 1/4-in. Carter downdraft instead of the dual carburetor on the larger displacement engine.

Other detail changes have been made in accessory equipment. A Carter fuel pump is used on this model. The starting motor is of smaller size; and Hudson for the first time has adopted a shunt-wound generator, using an Auto-Lite Model GDZ 6001 B

Model 500 Hudson engine. It has a bore of 3 9/16 in., a stroke of 3 7/8 in. and a piston displacement of 232 cu. in. Maximum output is 112 hp at 4000 rpm without fan, muffler, etc.



unit, the maximum charging rate of which is 35 amp.

Because of reduced torque capacity the powerplant is fitted with a Hudson nine-in. diameter clutch.

The standard Hudson transmission remains the same save for a change in second speed ratio, now 1.82 to 1.

Special transmission options on this model include overdrive in combination with the standard transmission; the well-known Hudson Drive-Master (HDM) automatic transmission without overdrive; and the Super-Matic Drive which is a combination package of Drive-Master with overdrive. To suit these combinations, the following rear axle ratios are offered:

	Std.	Opt.
1—with standard transmission, and standard transmission with HDM	4.1	4.55, 3.82
2—Standard transmission with overdrive, and Standard transmission with Super-Matic	4.5	4.1

Standard tire equipment is the four-ply 7.10-15 mounted on a five-in. E ORK rim. However tire inflation pressure has been boosted to 26 lb at the front and 24 lb at the rear.

Because of the change in turning radius of the car the steering gear has been changed in ratio from 20.4 to 18.2 to 1, using the Gemmer No. 305, roller and three-tooth type gear. Inclination of the steering column also has been altered.

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Three-quarter view of the new car showing styling of hood, front fenders and grille.

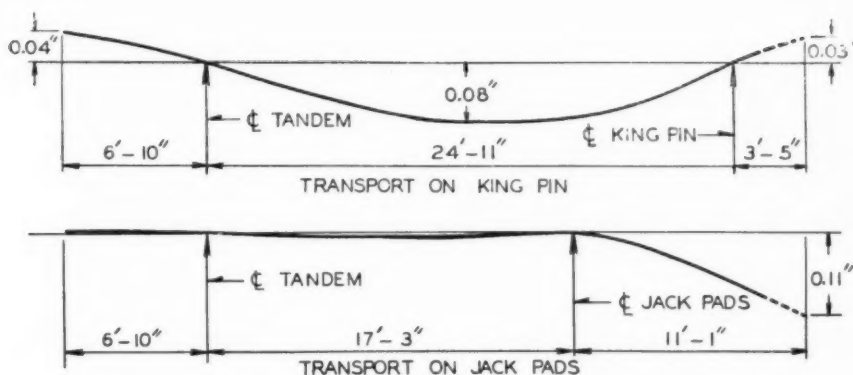


Fig. 1—Measured vertical deflections of 5700-gal aluminum alloy gasoline transport under full water load.

Tests of An Aluminum Alloy Gasoline Transport Semi-Trailer

By J. H. Dunn

Development Division
of the Aluminum Co. of America

and

R. L. Moore

Aluminum Research Laboratories
of the Aluminum Co. of America

MODERN gasoline transport trailers of the chassis-less or monocoque type are complex structures. Not only must the tank surround and retain a surging liquid commodity, but it must also act as the main strength member carrying the load. Provision must be made for the attachment of running gear, landing gear and king pin, requiring numerous bulkheads and auxiliary supporting and bracing members. A low center of gravity, obtained by the use of wheel

pockets at the rear, necessitates a front end kick-up or goose-neck. The changes in cross section thus obtained along the length of the tank obviously complicate any attempt at rational analysis.

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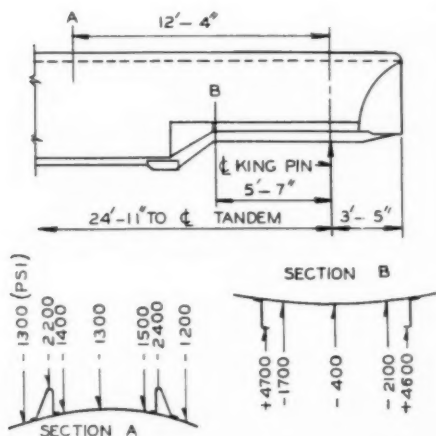


Fig. 2 (Left)—Measured longitudinal bending stresses in aluminum alloy gasoline transport under full water load.

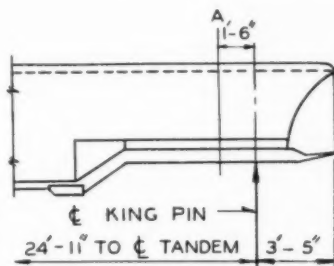


Fig. 3 (Right)—Measured circumferential shearing stresses on gasoline transport under full water load.

1950 Diamond T Trucks

FOR its 1950 offering Diamond T Motor Car Co. has announced a group of three basic models—420, 520, and 620—with companion models—420H, 520H, and 620H—which carry the maximum GVW ratings when equipped with optional heavy duty axles. Some of the major specifications are given in the accompanying table. The full range of standard and optional wheelbases is as follows: 130, 142, 154, 166, 172, 178, 190, 220, and 250 in., the 220 and 250-in. chassis being intended for school bus bodies.

Bright new styling, with entirely new sheet metal and new cabs are featured in the entire line. The front axle has been moved back 9 $\frac{3}{4}$ -in. on all models, thus reducing wheelbase correspondingly for the same body length.

All engines for this line are Diamond T—Hercules models mounted on a new four-point suspension system. Among the new mechanical features of these engines are the following: Larger exhaust manifolds; mechanical governor, improved carburetor, and valve rotators standard on the JXLD; larger bell housings for better clutch ventilation and easier clutch servicing; five-blade fan with asymmetric spacing of blades for quietness; elimination of hose connection between air cleaner and carburetor. It is also of interest that the Houde viscous type vibration damper is standard on all engines.

With air cleaner completely under the hood, provision has been made for supplying fresh outside air directly to the air cleaner inlet. This is done by means of an air duct built in the hood, extending from one side to the other and carrying air from grilles on each side of the hood. This air is brought into the air cleaner inlet through a vinyl rubber-grommetted opening in the duct. By removing an inner duct cover, heated under-hood air can be led into the air cleaner in extremely cold weather.

Engine accessories in front are driven by two belts, one being used for driving the fan. Accessibility for engine servicing has been improved in many ways.

Latest Models Feature New Styling and Cabs. Front Axles Have Been Moved Back Almost 10 In., Thus Shortening Wheelbase Without Reducing the Body Length

Much of the simple service can be done after raising the alligator hood. In addition, the right front fender is quickly detachable for other service jobs on the engine. Finally, the entire engine assembly can be removed with facility. A more accessible oil filler spout has been moved forward and upward.

All standard engines are equipped with King-Seeley velocity type governors set at 3000 rpm. The JXB and

JXC engines are fitted with cartridge type oil filters, while the JXD and JXLD engines have a built-in oil cooler in combination with a cartridge type oil filter.

A dust-proof distributor with full automatic advance is standard on all engines. Circuit breakers are employed instead of fuses with a separate circuit for headlamps. For city delivery service, engines can be fitted with a special Auto-Lite generator of 32-amp capacity with low cut-in at 390 rpm engine speed. An optional oversize generator too is offered for high speed service, this being a 50-amp Auto-Lite unit.

Radiators are of larger size for extra cooling, with a larger top tank, and adjustable shroud. In addition, radiator mountings are designed for easy removal.

Frames are wider at the front end and are extended to include bumper attachments. Spring hangers are of special fabricated construction and rear hangers are so designed as to be interchangeable right and left. Front springs have been redesigned for an easier ride, this being supplemented by use of Houde double-acting shock absorbers at the front as standard equipment.

The steering gear has been moved forward with the gear box bolted to the top of the frame, making for easy removal. At the same time it is readily adjustable several inches for changing the height of the steering wheel. The steering gear on all models is Ross twin cam and level type—TA-21 on the 420 and 520 models, TA-26 on the 620.

One of the major features of the new chassis is the independent four-point mounting of the entire cab, front sheet metal, and radiator. At final assembly all of these become an integral unit free from weaving



The 1½-ton Model 420 with 14-ft stake body. Its improved JXB Super-Service engine develops 94 bhp at 3000 rpm. Oversize engines are available for tractor-trailer service. With standard specifications maximum gross vehicle rating is 16,300 lb. With oversize rear axle model becomes 420H and rating is 17,200 lb.

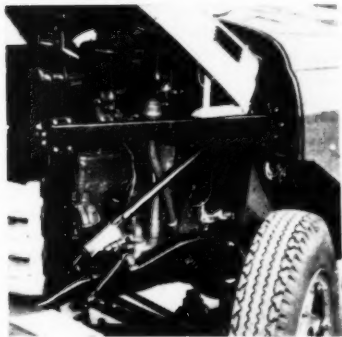
of the frame. Bolted to the dash of the cab are heavy channel members which run forward to a structural U-member which carries the radiator core, the latter being insulated from shock and vibration by use of springs and rubber pads.

The standard service brake setup includes as regular equipment the Bendix 9½-in. Hydro-vac booster on all models. In addition, a full Westinghouse air brake system is offered as optional equipment on the 620 and 620H models. This is supplied with a 7¼ cu-ft compressor and two 1240 cu-ft air tanks. Front brakes for this system are 16¼ by 2¼ by ¾-in.; rear brakes—16½ by 5½ by ¾-in.

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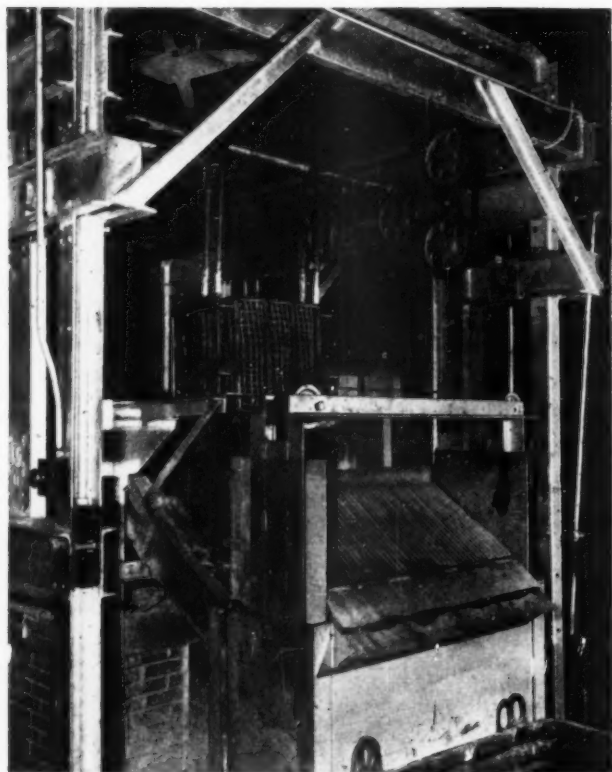
Fabrication of the one-piece alligator-type hood involves an extremely deep draw. Note louvers, cross channel, and rubber flange which connects with air-cleaner on engine to bring in outside air to the carburetor.



Here the left fender has been removed, showing the front mounted steering gear and convenient location of distributor and water pump. Quick detachable front fenders is one of the features of the new line. Removal is said to require only three to four minutes. This permits easy access to engine units.

Condensed Specifications 1950 Diamond T Trucks

MODEL	420 420H	520 520H	620 620H
Nominal Rating (ton)	1½-3	2-4	2½-5
GVW Rating (lb.) (max.)	16,300-17,200	18,200-19,000	21,200-22,200
Gross Train Weight (lb.) (max.)	30,000	35,000 (with opt. engines)	35,000
Wheelbase (std.) (in.)	130	130, 142	130, 142
Engine (Diamond T Hercules 6-cyl L-head) (std.) JXB 94 bhp (optional) JXC 101 bhp JXD 113 bhp	JXB 94 bhp JXC 101 bhp JXD 113 bhp	JXC 101 bhp JXD 113 bhp	JXD 113 bhp JXD 130 bhp
Brakes—Front	Lockheed 15¼ x 2¼ x 5/16	Lockheed 16½ x 2½ x 5/16	Lockheed 16½ x 2½ x 5/16
Rear	Wagner Hi-Tork 15 x 4 x 3/8	Wagner FR 15 x 4½ x 3/8	Wagner FR 16 x 5 x 3/8
Transmissions: Standard	Warner T9A, 4-speed	Clark 205V, 5-sp.	Clark 205V, 5-sp.
Optional	Warner T9B or Clark 205VO Clark 205V	Clark 205 VO	Clark 205 VO
Clutch: Standard	Borg & Beck 11-in.	Borg & Beck 12-in.	Borg & Beck 12-in.
Optional	Borg & Beck 12-in.	Lipe 12ML-12-in. Borg & Beck 12-in.	Lipe 12ML-12-in.
Rear Axle: Standard	Clark R1000	Clark R-1250	Eaton 1715
Optional	Eaton 1350, 2-sp. Clark R-1250	Eaton 1715 Eaton 18500 (two-speed) Eaton 1350 (two-speed, light duty)	Eaton 18500 (two-speed)



Typical of the salt-bath annealing furnaces used at Canton is the one seen here. Depending upon size and shape, the work is transported through the salt bath cycle by means of the conveyor, carrying work pieces in special baskets or carriers. At the end of the cycle work is dumped automatically onto the apron and dropped into the bin in the foreground.

STEMMING from the accumulated experience of many years of research and production work the Canton Forge Plant of Ford Motor Co. represents a self-contained forging plant incorporating many techniques of recent origin so far as mass production applications are concerned. Foremost among these are the extrusion forging of front spindles at an exceptionally high production rate—over 6000 pieces per eight-hr shift—and automatic salt bath transformation annealing of certain parts.

One of the major advantages of a specialized operation such as this is the opportunity it affords for constant experimentation with new techniques, equipment, materials, and the other variables of the forging process, including die design and die materials. For example, although extrusion forging has been confined in regular production to the front spindle, experimental work has been carried out on a number of other parts considered suitable for this process. However, no further production applications will be made until

heater of continuous type, the billet being ejected automatically and delivered to the forging press by a chute. Induction heating is closely controlled to provide a forging temperature of 2250 F.

Extrusion forging is done in a 1500-ton capacity No. 5 Maxipres. One of the major features of the operation, naturally, is the design of the extrusion die. It may be noted that considerable work still remains in the selection of the proper die materials for this application. Currently punch life runs from 1000 to 1500 pieces while the die runs from 2500 to 3500 pieces. Certain die materials said to promise from three to five times the present life expectancy are being studied at the present time.

Another of the important features of die management is use of the proper lubricant. Ford currently employs a compound consisting of a mixture of 60 per cent, by weight, of M-62 machine oil, 25 per cent Brookes compound, and 15 per cent Ceylon plumbago.

(Turn to page 62, please)

New

By
**Joseph
Geschelin**

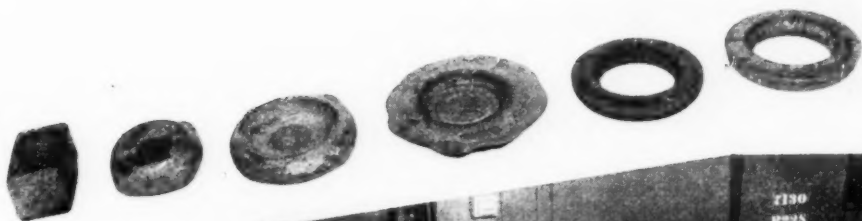
all of the variables in the extrusion process have been thoroughly explored.

The front spindle is made of SAE 5132 alloy steel, received in the form of 2½ in. round bars, then sheared into 315/16 in lengths. Gross weight of the forging is 5.52 lb and net weight is 5.20. For the forging operation bars are fed into an Ajax induction

Techniques

at Ford's Forge Plant

Extrusion Forging of Front Spindles, Automatic Salt Bath Transformation
Annealing of Certain Parts and Other Significant Operations Are
Described in This Article



Basic stages in making the Ford ring gear are shown here, starting with the square billet at the extreme left.



Ford ring gears are forged in this 2500-ton Ajax forging press, using a three-step die—break, block and finish. The 3 1/4-in. x-c square billets are heated to forging temperature in the Tocco-Budd continuous induction heater which may be seen directly in the foreground.



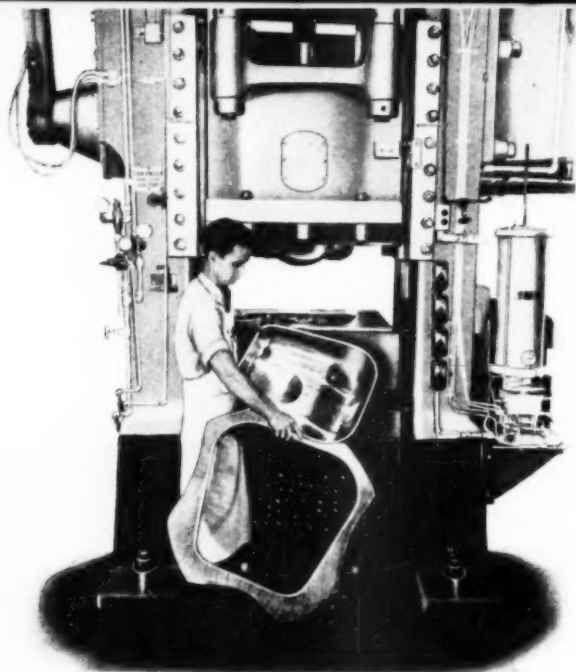


Fig. 1—Double action press with part and trim

Draw

By J. J. Sloan

Production Design Engineer,
North American Aviation, Inc.

production on steel mating form dies to be made at a cost of approximately 700 hr. As actually produced, however, the entire contract was run off on two dies, a round dome first-form die already available as a standard tool, and a Kirksite finish-form die made in 60 hr. It must be noted here that all elements of design, tooling, and production cooperated on this result in such a spectacular saving. The design of the part was modified by increasing the corner radii to a reasonable figure. The importance of proper design of

drawn shapes cannot be overstressed, otherwise extra dies and operations are many times added to attain a result which is relatively unimportant to the function of the part.

The common airframe materials most suited to deep drawing are the soft aluminum alloys, 2SO, 3SO, 52SO, 3SI/2H, and carbon and stainless steels. The aluminum alloy 24SO can be drawn just as well as the above materials in simple cylindrical cups, but presents less favorable formability in boxes and domes. The heat-treated alloy 24ST has only limited formability by the draw-forming process. Copper and

THE draw-forming process is one in which a metal sheet is compressed in one direction while being elongated in another. Under these conditions the metal can be deformed to a much greater extent than when it is simply stretched in one direction. Consequently, the drawing process may often be used to form parts which otherwise would be very difficult to fabricate on the hydropress or drop hammer.

The most flexible arrangement for drawing sheet metal is obtained by using a double acting press having an independently actuated ram to exert pressure on the hold-down ring. One such press is shown in Fig. 1. Single acting hydraulic and crank presses with air cushions for operating the hold-down device may also be used. It is even possible to use a simple single-acting crank press by designing the die itself so as to contain a spring-mounted draw ring which is energized by the action of the main ram. The single acting press in conjunction with special dies produces at the fastest rate, but usually involves higher die cost that for those used on the double acting press.

It is customary to think of draw dies as being very expensive; but such is not necessarily the case in airplane work where limited numbers of parts are usually involved. It has been found that Kirksite or even plastics will give adequate life in many cases. Hold down rings also may be made of Kirksite. Expensive steel mating dies are by no means necessary in the majority of cases.

As an example, an ash tray was estimated for

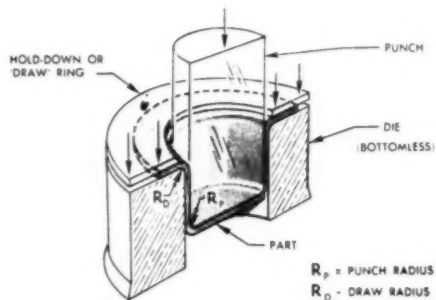


Fig. 2—Schematic assembly of die hold-down ring and punch

Forming with Inexpensive Dies

Up-to-Date Information and Examples of Deep Drawing and Waffle Forming, Particularly as Applied to Aircraft Manufacture, are Presented in this Article. Drop Hammer Forming and Its Application to Waffle Forming are Among the Subjects Covered.

brass in sheet form can be readily drawn.

The chart, Fig. 3, shows the practical limits for single-operation forming of cups and boxes. The data are based on extensive experiments conducted under production conditions. A reasonable margin is provided to cover possible variations in material properties and production techniques. The data are presented in non-dimensional form (i.e., in terms of ratios).

When designing for draw forming:

1. Approach the cylindrical as closely as possible if maximum depth is required.
2. Minimize flange widths, especially adjacent to critical draws, since the width of the flange must be counted as part of the draw. On boxes, eliminate flanges at sharp corners if possible.
3. Design for maximum possible symmetry — equal depth draws throughout, uniform sections, flat planes, no excessive localized draws.
4. Use radii in accordance with the following rules

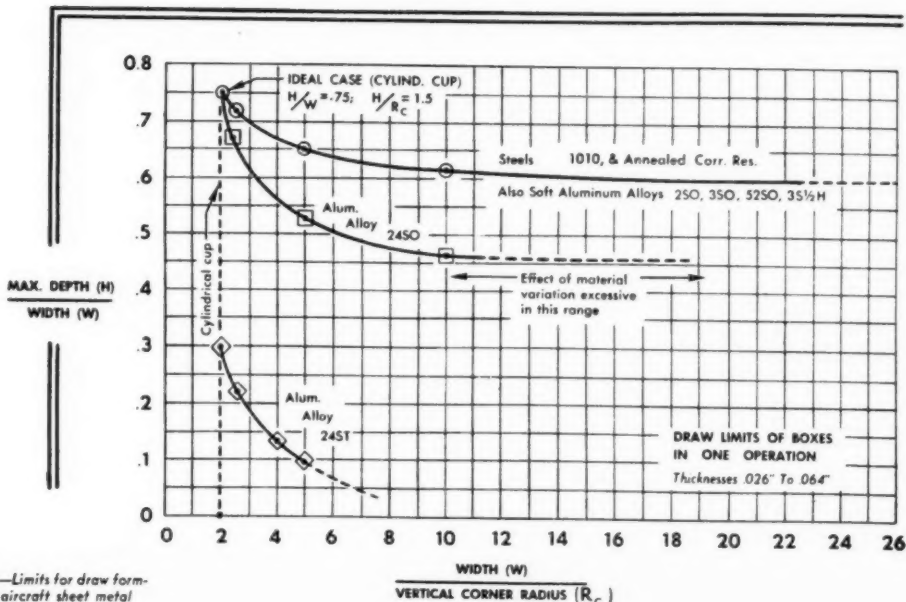


Fig. 3—Limits for draw forming aircraft sheet metal

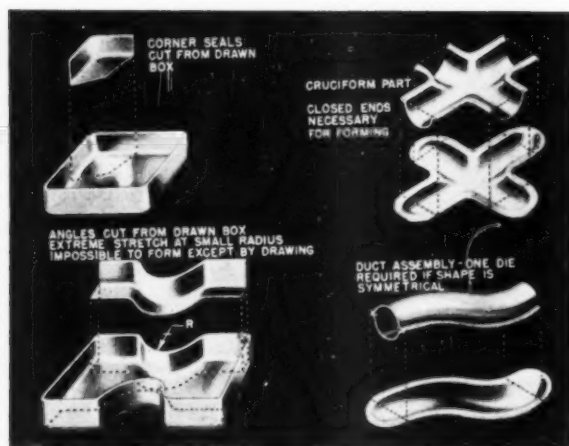


Fig. 4—Examples of oddly shaped parts which may be cut from drawn shapes

(see Figs. 2 and 3 for nomenclature):

R_c —Never less than $5t$

R_p —Never less than $5t$

R_f —Minimum = $5t$

Recommended = $8t$

Maximum = $10t$

R_b —Not less than $10t$ or $2R$

5. Avoid draw depths requiring multiple operations. Such operations increase tool cost and, in the case of aluminum alloys, have a questionable effect on the properties of the material.

6. Shape parts in such a manner that they can be withdrawn freely from the dies after forming.

7. For hemispherical domes, make the bottom radius R_b , Fig. 3, less than $75t$ unless mating dies are contemplated. Such a radius will eliminate the tendency to pucker.

8. Where practicable, specify that slight wrinkles (0.010 in. max. depth) are permissible in the flanges of a drawn part; and that slight distortion in like amounts is permissible in the

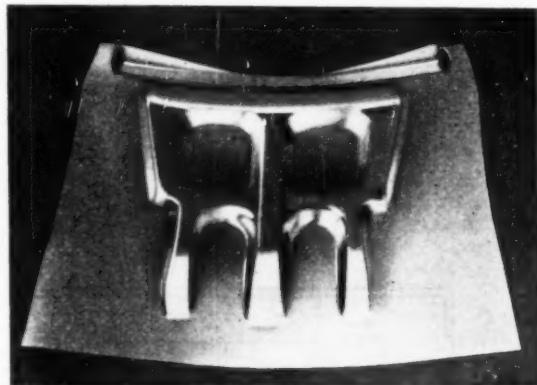


Fig. 5—Cowl flap inner stamping formed on the drop hammer

nearly flat plane flanges. Most drop hammer parts which involve appreciable draws exhibit this tendency to wrinkle in the flange.

Multicellular structural units formed from sheet metal on the drop hammer can be designed to replace an assembly of many pieces of channels, stiffeners and gussets riveted together. Such a structure, rigid and light in weight is exemplified by the cowl shown in Fig. 5. It can be produced at a cost much less than a corresponding riveted assembly chiefly because of the elimination of many details and their attendant paper work, handling and tool cost.

Waffle forming is adaptable to many types of structure, entrance doors, landing gear doors, cowling, cooling flaps, etc. Its chief disadvantage is that, due to the tolerances incurred in drop hammer forming, it is

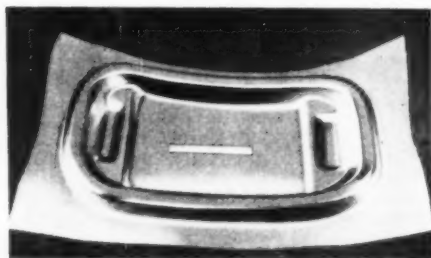


Fig. 6—Inner stamping for main entrance door

difficult to provide for load transmission through concentrated areas into the adjacent structure. For example, hinges and latches on opposite sides of a door cannot be consistently located from the waffle. Acceptable bending loads are lighter because the structural continuity is broken up at intersections of the elements; but this may be overcome to some extent by staggering intersections.

Fig. 6 shows the inner door stamping for a bomber main entrance door designed for the drop hammer. A cost comparison has been made, as shown for the part as designed for production and the preliminary design of built-up structure which included 23 details. This is a typical comparison of this type of structure and includes rivets, assembly time and assembly fixtures required for the frame only.

	Built-up frame	Stamped inner door
Material	\$ 2.45	\$ 5.50
Labor & burden	\$ 19.75	\$ 6.15
Total	\$ 22.20	\$ 11.65
Tools	\$1350.00	\$950.00

Applicable materials for waffle forming are 2SO, 3SO, 52SO, 61SO, and 24SO aluminum alloys in gages from 0.025 in. to 0.091 in. and annealed corrosion-resistant steel in gages 0.018 in. to 0.063 in. Best results are obtained with 0.040 in. to 0.051 in. thickness in all materials.

In designing waffle shapes the same elements of design are present as for all drop-hammer forming.

1. Draft angle should be as large as possible. A minimum of three deg may be used where the wall is

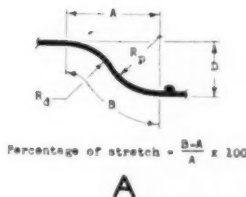
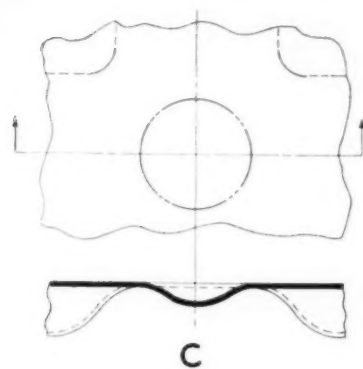


Fig. 7—Elements of waffle design

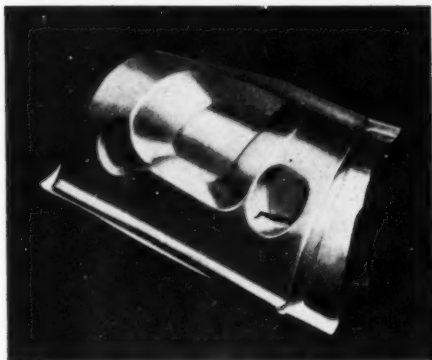


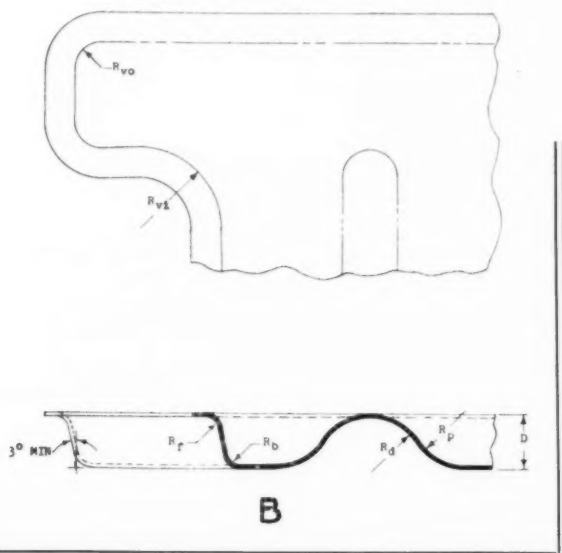
Fig. 8—Internal features are formed by stretching only

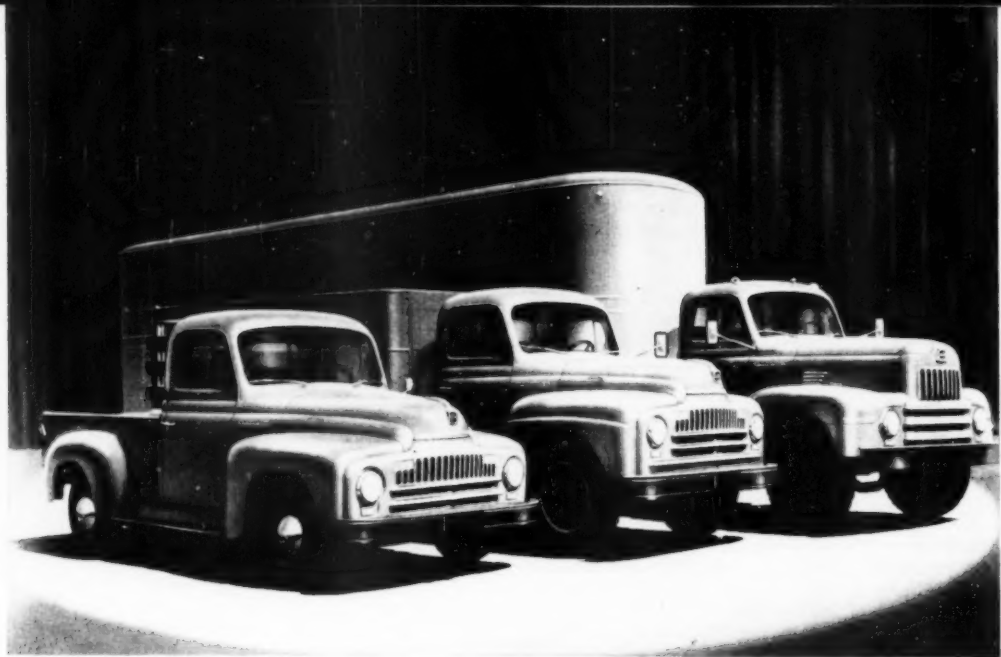
adjacent to the outline of the part and material is available for the draw.

2. Internal features may be formed by stretching only. Stretch is calculated as shown in Fig. 7-A and should not exceed 30 per cent for 2SO, 3SO and annealed stainless steel or 20 per cent for 52SO, 61SO and 24SO. Avoid excessive localized draws, design to distribute stretch over large areas. Fig. 8 shows the result of attempting to form a deep recess with small radii.

3. Thin materials buckle easily and, once formed, the wrinkle must be removed by hand hammering. Therefore, use materials in the optimum gages 0.040 in. to 0.051 in.

4. Use radii as follows (see Fig. 7-B for nomenclature) (Turn to page 76, please)

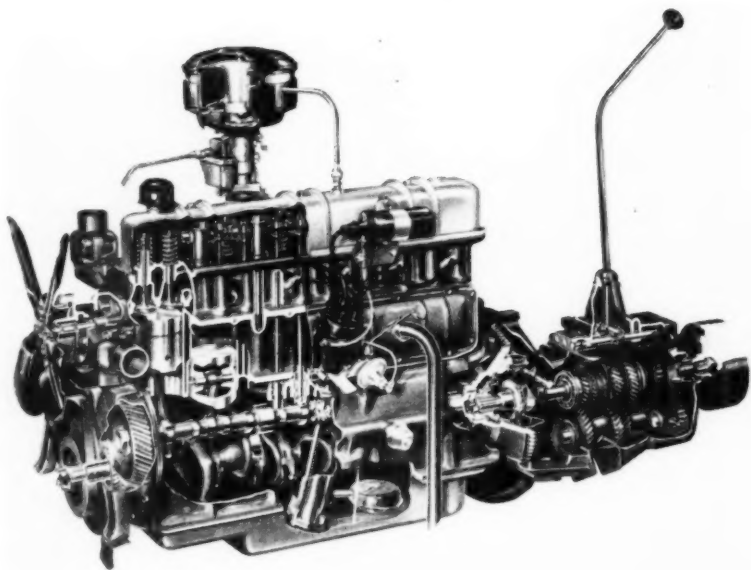




IHC's New L-Line

↑
The models shown here of the L-110, L-160 and L-190 series are representative of the new L-Line separate truck chassis models. The standard classification model L-112 at left has a gvw of 4800 lb, the standard model L-162 at center has a gvw of 16,000 lb, and the Roadliner (tractor) classification model L-195 has a gvw of 48,000 lb.

Cutaway view of the Silver Diamond engine and four-speed Synchro-shift transmission. Available in two sizes, the new engine is used to power light and medium duty trucks of the new line. The four-speed transmission shown, with the SD-240 engine, is standard equipment in the L-160 series truck models.



A COMPLETELY redesigned and re-engineered line of International trucks has been announced by the Motor Truck Division of International Harvester Co. The new L-line, consisting of 87 separate truck chassis models features complete restyling, a new "Comfo-Vision" cab, and chassis dimension engineering that permits better load distribution, greater maneuverability, shorter over-all lengths and improved engine accessibility. An all-new engine, the Silver Diamond, has been added to the line and International's other engines have been refined and improved.

The L-line is spearheaded by four classifications of four-wheel model trucks—the Standard, ranging from 4200 lb to 40,000 lb GVW; the Schoolmaster, comprising five bus models ranging from 12,500 to 24,000 lb GVW; the Loadstar, ranging from 16,500 to 29,500 lb GVW; and the Roadliner, ranging from 16,000 to 30,000 lb GVW.

The new International line further features new Metro multi-stop units, product of the company's

Bridgeport, Conn., plant, ranging from 5300 to 10,000 lb GVW, and including three different body sizes, one adaptable for use as a bus; a new group of six-wheel chassis units, ranging from 22,000 to 50,000 lb GVW; a new group of cab-forward chassis units, ranging from 14,000 lb GVW.

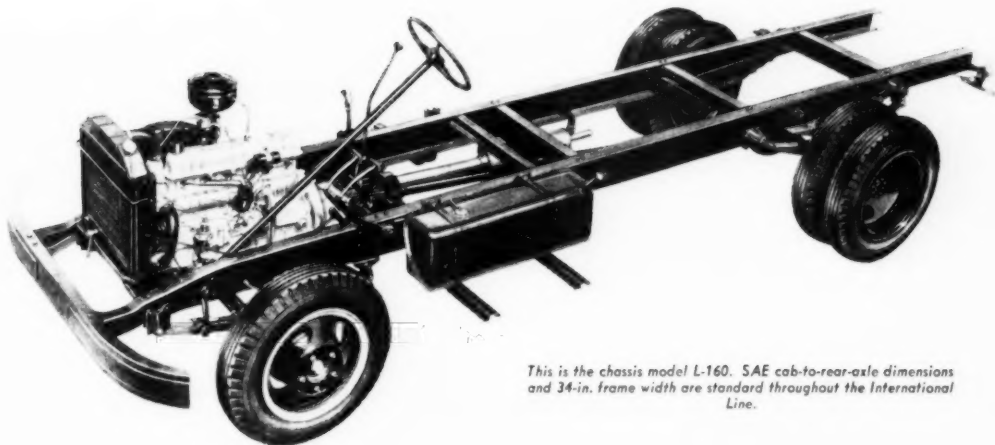
The company's "West Coast" trucks, manufactured in International's Emeryville, Calif., plant, include two highway and four off-highway vehicles, ranging from 30,000 to 90,000 lb GVW.

The new Silver Diamond engine, used in the company's light and medium-duty trucks, is a valve-in-head, six cyl power plant and is built in two sizes—the 220 cu in. displacement size which develops 100 hp and the 240 cu in. displacement size rated at 108 hp. Each has a compression ratio of 6.5 to 1. Features of the engine are: Precision-type, replaceable main bearings, heavy, heat-treated crankshaft, rifle-drilled connecting rods for pressure lubrication to full-floating piston pins, and precision machined combustion chambers. The aluminum alloy pistons are equipped with four rings, and exhaust valve seats are of heat treated alloy. Wearing surfaces of the camshaft are induction hardened.

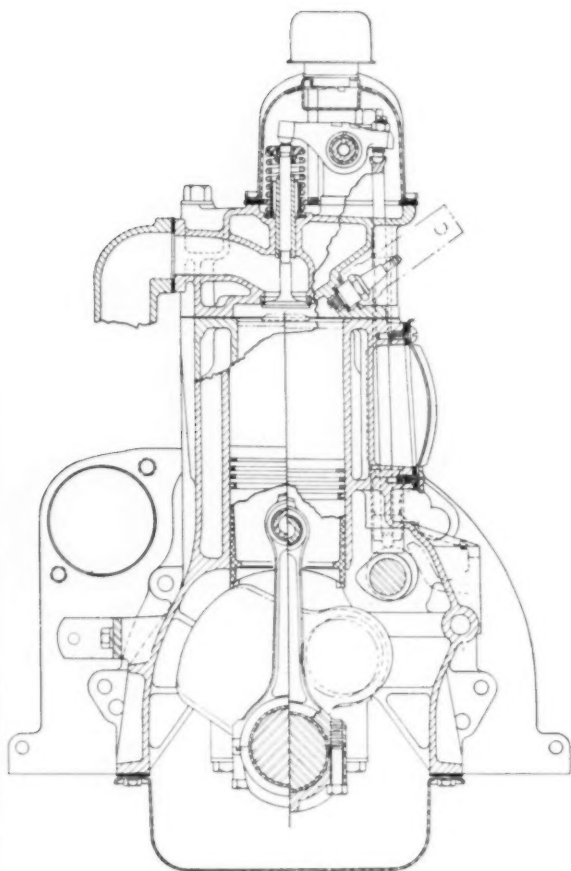
The Super Blue Diamond engine which supersedes the Blue Diamond has a displacement of 269 cu in.

of Trucks

Features Include Shorter Over-All Lengths, Complete Restyling and Better Load Distribution. All-New Silver Diamond Engine Powers Light and Medium Duty Trucks. Other Engine Models Improved.



This is the chassis model L-160. SAE cab-to-rear-axle dimensions and 34-in. frame width are standard throughout the International Line.



Cross section of the Silver Diamond engine. This line drawing shows part of the piston, rod, and crankshaft of each of the two models and illustrates the difference in stroke between the 220 and 240-cu. in. engines.

and a horsepower rating of 100.5. Compression ratio is 6.3 to 1.

In addition to features retained from the Blue Diamond, the Super Blue Diamond has Stellite-faced valves, Durachrome heat-treated valve inserts, a more efficient crankcase ventilating system, an improved lubrication system, and deep-well tappet fittings.

The Super Red Diamond engine which replaces the Red Diamond is available in three sizes. The 372 cu-in. displacement size develops 144 hp; the 406 cu-in. displacement size, 154 hp; the 450 cu-in. displacement size, 162 hp. Compression ratio of the Super Red Diamond is 6.3 to 1.

Among the new features on the Super Red Diamond engine are an outside air intake on the carburetor; larger carburetors, intake ports and manifolds; Slo-Roto exhaust valves; a new fuel saving combustion chamber design; and thin replaceable piston sleeves.

The dimensions of the chassis of the new L-line have

been engineered to provide better load distribution, greater maneuverability, shorter over-all lengths and improved engine accessibility. Biggest change in chassis dimensions is in the wheelbases, which have been shortened as much as seven in. in some models. The shorter wheelbases, together with re-proportioned cab-to-rear axle dimensions and front-axle-to-cab dimensions, have resulted in a shifting of load weight, so that it is in balance between front and rear axles.

Better maneuverability results from the shorter turning radius of the shorter wheelbases, as well as from the widened axle treads. The turning angle on practically all models throughout the line has been increased to a minimum of 37 deg, for both popular and standard tire sizes.

The shorter wheelbases and re-arrangement of other chassis dimensions have made possible shorter over-all lengths with no actual decrease in load-carrying lengths. In some cases greater load-carrying lengths are possible within the shorter over-all lengths of the truck. While the cab has been moved forward, a special cowl design makes it possible to open up more space between engine and cowl, so that the engine is actually more easily accessible than in the past.

The L-line offers a complete selection of transmissions. Main transmissions available include two sizes of three-speed Synchro-shift; a four-speed sliding gear; a new four-speed Synchro-shift; four sizes of heavy duty, five-speed constant-mesh, with direct or overdrive in fifth; and five-speed Synchro-shift, with direct or overdrive in fifth. A number of auxiliary transmissions also are available.

Wider rear axles are available in the new models. Hypoid single-speed double reduction, and two-speed with electric shift are included in the line.

In L-line cabs, full width seats are built as a unit, so that the proper angle between back and seat is maintained at any position of seat adjustment. Many optional seats are available, designed to meet any particular driver preference. These include foam rubber or deep coil spring construction, either full width or driver seat only.

An all-weather cowl ventilator works in conjunction with ventilating windows to insure proper fresh air circulation. A fresh air heating-defrosting-ventilating system, designed to operate with cowl open so that fresh air is drawn in, is optional equipment.

A large, one-piece curved windshield, gives unobstructed full front vision. The windshield center post has been eliminated, and corner posts have been moved back to reduce any blind spot, while a shorter front-axle-to-cab dimension gives a closer view of the road.

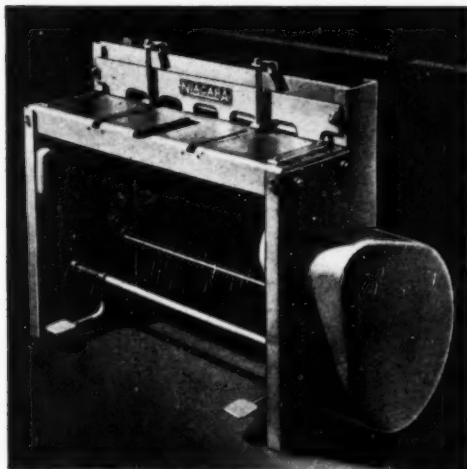
E-83—High Speed Power Shears

Introduced by the Niagara Machine and Tool Works of Buffalo, N. Y., a new line of high-speed power shears for light gage sheet metal can operate continuously at 125 strokes per minute on mild steel up to 20 gage in thickness. Full visibility of the cutting edge through the arched openings and over the top of the holddown bar facilitates shearing to accurate layout lines.

Housings, bed, holddown and cross-head are fabricated from electrically welded steel plate to give greater strength, greater rigidity and reduced weight for portability. Bearings and



For additional information please use coupon on page 54



Niagara high speed light power shears

ways are bronze. Axial air gap or "pancake" type motor, almost entirely concealed in the right hand upright, make a compact completely covered motor drive unit.

E-84—Pre-Assembled Paint Spray Booth

A paint spray booth providing suction of paint-laden air at both top and bottom of the water curtain is presented by Newcomb-Detroit Co., Detroit, Mich. This Roto-Wash spray booth provides pre-assembled construction and simplified maintenance.

Since paint-laden air is drawn into the Roto-Wash booth both over and under the water curtain simultaneously, a more even flow of air is claimed to be created across the face of the booth, trapping the maximum amount of paint over-spray in the spraying area. This also permits a pre-wash of the air before it enters the washing section of the booth, with consequent elimination of paint-fog in the booth between spraying cycles.

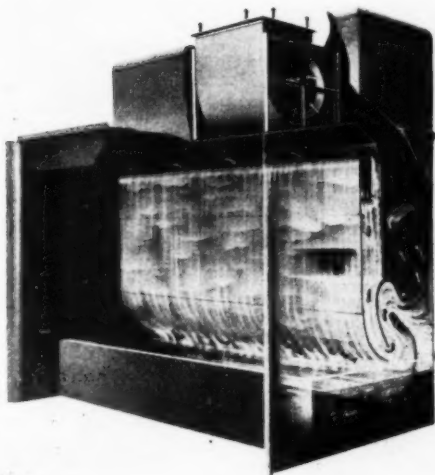
Washing principle employed in the booth is also of new design. The entire washing action is created by suction from an exhaust fan. Air passing over the water curtain is pre-washed as it passes down the rear of the water curtain. Air passing under the water curtain is washed as it goes through the water, cascading from the curtain into the tank. At this point the two streams of water and air join and are carried into the scrubbing Roto-Wash torrent. As the spray-charged air stream passes through the Roto-Wash, its direction is reversed twice when it is made to impinge against metal baffles. This results in a thorough scrubbing action and in drop collisions which completely trap paint particles in the water. The paint-laden water settles as sludge in the tank below.

As the air leaves the Roto-Wash, the velocity decreases sharply, which separates the air and water. Remaining droplets of water are then separated out as the air passes the moisture separator before entering the exhaust fan, clean and free of paint and water.

Aiding maintenance, the flood sheet, over which the water curtain flows, is hinged at the top for access to the area back of the water curtain. At the rear of the booth, large doors are provided to reach the baffles and the water tank. A large door permits access to a built-in fan. There are no hidden sections of the Roto-Wash booth to be maintained. Since the sole source of water is the open-topped reservoir at the top rear of the water curtain, only one pipe is required.

The service box, mountable on either side or rear of the booth, contains all working parts of the booth except the fan and motor. The pre-assembled booth requires only the connection of water and electrical services and the exhaust stack, upon installation.

Newcomb-Detroit pre-assembled Roto-Wash paint spray booth



E-85—Diagonal Lapping Machine

Significant development in gear lapping is said to be afforded by the new Red Ring diagonal lapping machine of the National Broach & Machine Co., Detroit, Mich., which laps gears conventionally or diagonally with equal facility.

The diagonal method permits a crown to be produced on straight teeth during the lapping operation. Tapered teeth can be corrected. Diagonal lapping also corrects most of the eccentricity error. Oversize gears can be brought to size without depending on the machine operator for size infeed control.

Conventional lapping on this machine may be selected for wide faced gears merely by locking the work table in line with its direction of reciprocal travel.

The principle of crossed axes lapping—consistently proved superior for the past 20 years—has been retained in the design of the new machine. Consequently, the lap head setting can be precisely positioned for any selected angle between work gear and lap axes. Lap speeds and table feed may be mechanically controlled to meet any requirements.

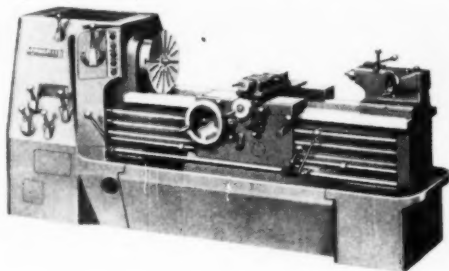
The subwork table is hinged to compensate for nonuniformity in gear size, to facilitate loading, to reduce operator fatigue, to maintain any predetermined pressure between lap and work, to compensate for lap wear and to speed production. Its action is air-operated and spring-loaded.

The work gear is placed in loose mesh



For additional information please use coupon on page 54

Springfield heavy duty 16-in. lathe, Model S



with the lap and the tailstock clamped. Operating the air valve releases the subtable and allows the springs to raise it enough to force the work into close mesh with the lap. This also locks the

table in lapping position and starts the machine. At the end of the lapping cycle, the air cylinder unlocks the table and lowers it so that the work may readily be unloaded.

E-86—Heavy Duty Lathe

The Springfield Machine Tool Co., Springfield, Ohio, is manufacturing a new 16 in. Model S Lathe with spindle having 24 speeds. Hole through the spindle can be slightly in excess of 2 in. when required. Heavy hardened and ground gears give a speed range of 15 to 1000 rpm. A multiple disk, wet type combination clutch and brake running

in a bath of oil controls the spindle. Two levers control the entire 24 speed changes. One lever has two shifts; the other lever controls 12 gear changes. The shifter mechanism allows shifting directly from any speed to any other speed without passing through intermediate points.

A combination of quadrant gearing and the 60 feed and thread gear box provide a quick change-over from standard operations to metric, module and diametral pitch set-ups. In addition, the 60 feed box includes all standard threads, and any of the optional ranges have $11\frac{1}{2}$ and 27 pitch among others. Feed gearing is completely enclosed. Oil cascades through the gears and bearings from the head stock down into the cabinet leg. Four convenient levers control the entire 60 gear changes.

The extra wide and deep bed takes advantage of a new equilateral triangular type of girthing. This design not only gives extra chip clearance through the bed, but has also proved to be from four to ten times as rigid as conventional designs in laboratory tests for torsion, tension, compression and other effects, the company states.

A tailstock with the handwheel offset 50 deg. toward the operator has two-speed action for slow drilling feeds and rapid advance. Both heavy duty clamping and quick acting light duty clamping are provided.

Power rapid traverse and main drive motors are both mounted in the cabinet leg, a removable panel giving access.



Red Ring diagonal lapping machine put out by the National Broach & Machine Co.

E-87—Continuous Threading Machine

The Roto-Matic Type GG Double End Horizontal Continuous Threading Machine, put out by Davis & Thompson Co., Milwaukee, Wis., has been adapted to the threading of both ends of suspension arms.

The machine has twelve spindles provided with lead screw feed, carrying die heads six, on each end, permitting the continuous threading of work pieces from both ends. Continuity of thread is maintained by lead screw bushings always being in the same relation.

Loading of the work piece is done by the operator at the open station while the machine is in operation. As it progresses through its cycle, work pieces are held by equalizing jaws in the fixture through a chain clamping arrangement. Lead screw is positively engaged and die heads fed on to the work piece. When the threading operation is complete, die heads are opened by an outside contact ring, the lead screw is re-



For additional information please use coupon on page 54

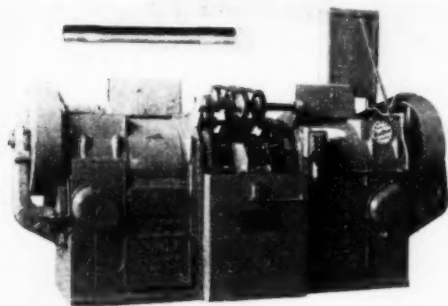
ard machine with base column height will drill holes at any point in a range from 18 in. to 134 in. above the floor with the spindle in a horizontal position. It is capable of performing all radial, horizontal or angular operations such as drilling, tapping, boring, spotfacing or reaming on a production

basis; can be supplied for stationary fixed-location applications or for use as a fully portable unit with stabilizing spreader arms, leveling jacks and lifting bail.

It has a 4-in. diam nitrided spindle with 18 in. of manual and power feed, either No. 5 or No. 6 Morse taper hole and nine speeds, in a choice of three ranges from a minimum of 25 rpm to a maximum of 800 rpm with a spindle drive power range from 10 to 20 hp. The spindle head swivels 360 deg on the trunnion and the trunnion rotates 180 deg on the rails, permitting the spindle to be positioned for angular, compound angular, horizontal or vertical operations in any combination of vertical, horizontal and radial positioning movements. Both swiveling units are power driven with controls located in the pendant station. The rails supporting the swiveling spindle head and trunnion have a power driven horizontal traverse of 36 in. for rapid tool positioning with hand wheels for final positioning.

The entire rail unit, carrying the spindle head, spindle drive and transmission, is provided with 60 in. of vertical movement on the column, with power rapid traverse up and down. The controls for this movement include inching controls and are located in the pendant station. The column which carries the rail unit is 22 in. in diam, can be swiveled through 360 deg to permit machining operations at any point around the machine, and is provided with an electric swivel clamp which eliminates off-position creep.

The column base is carried on a heavy runway which provides 48 in. of hori-



Davis & Thompson horizontal continuous threading machine, Model GG

leased, the spindle returned to starting position, fixtures are automatically unclamped, and the work is rolled into a discharge chute.

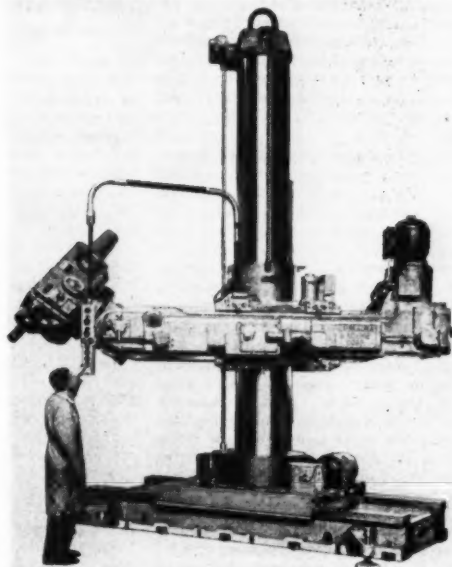
Lead screws are engaged before the dies contact the work pieces and are not disengaged until after the die heads trip open. By eliminating the necessity for the chasers carrying the thread along to its end, a perfect thread is said to be insured.

On the machine illustrated a production of 1060 suspension arms per hour was obtained. Productions of 1500 or more pieces per hr are possible depending on type of work piece and material characteristics.

E-88—Drilling and Tapping Machine

The new heavy duty, full-universal portable horizontal drilling and tapping machine, Model 140-U, of Kaukauna Machine Corp., Kaukauna, Wis., provides 97 in. radial reach with the spindle in vertical position, and the stand-

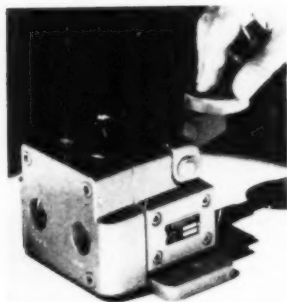
Kaukauna heavy duty universal drilling and tapping machine, Model 140-U.



zontal movement by power with both rapid traverse and inching in either direction. Controls are also located in the pendant station. Enclosed electrical collector rings are mounted on the column base to transfer power to the rail slide unit and eliminate cable wind-up or interference when the column is rotated.

Nine spindle speeds and nine spindle feeds are each selected by dual rotary selector levers with direct reading indicator dials showing the speed or feed engaged. Additional travel of any of the various units can be provided.

F-113—Air Control Valve



Hannifin hand operated air control valve. Model NHS.

Introduction of a new, fast cycling type of hand operated valve which provides 4-way directional air control for the operation of single or double acting pneumatic cylinders and other air operated equipment is announced by Hannifin Corp., Chicago, Ill. In contrast with conventional hand operated valves requiring manual movement of a handle through an arc, the new design provides what approximates "push button" control.

Light pressure applied by fingers, palm, or knee to depress the control knob $\frac{3}{8}$ in. is all the motion required. Air line pressure, acting through a pilot control connected to the control knob lever, supplies the force to move the piston-operated main valve. Valve action is almost instantaneous, quicker, it is said than by handle operation.

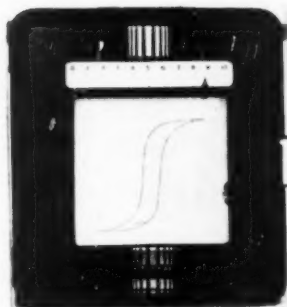
Designated as Model NHS, the valve features a reciprocating, packless, self-lapping main valve disk. A light compression spring raises the control knob when the operator's hand is removed. Constructed for heavy duty industrial service, the valve is available in $\frac{1}{2}$ in. and $\frac{3}{4}$ in. sizes for air line pressures from 25 to 150 lbs. IN and OUT air line connections are located in the top of the valve with pipe connections to air cylinder in the back. For remote control or to simplify piping connections, the control knob can be located on the end of an extended rod connected



For additional information please use coupon on page 54

to the operating lever. The valve itself can be mounted in any position that keeps the valve operating piston in a horizontal plane.

F-114—Recording Instrument



Leeds & Northrup Speedomax Recorder

A new Speedomax Recorder offered by Leeds & Northrup Co., Phila., Pa., now automatically plots the relationship between two variables, showing one as a function of the other. Tedious compilation and manual plotting by experienced personnel are eliminated. Instead, the variables to be plotted are converted d-c signals, and connected to the instrument, one to the horizontal axis and the other to the vertical axis. The result is a permanent record, accurately plotting in minutes data that would require hours using the usual point by point method.

As compared to the usual recorder, which has only one measuring circuit and a constant speed non-reversing chart paper drive and which plots a variable as a function of time, this new recorder has two measuring circuits. Pen travel (X axis) is controlled by Speedomax G electronic circuit. A similar circuit controls the chart paper drive, (Y axis) and makes it reversible. Thus, the new recorder makes it possible automatically to draw curves such as a hysteresis loop, temperature

vs. temperature difference, stress vs. strain or other two variable curves.

The pen takes only 3 seconds for full scale travel of 9 $\frac{1}{2}$ in. Full chart travel is 10 in. and requires 4 seconds. Standard minimum input voltage for full travel of the X coordinate is 2.5 millivolts, while the Y coordinate requires a minimum of 10 millivolts, for full travel.

F-115—Stress Analysis Tester

New product in the testing field consists of the BA-1 bridge and amplifier of Ellis Associates, Pelham, N. Y., designed to provide the missing link between SR-4 gages and similarly actuated pickups and any cathode ray oscilloscope. The combination of gages, BA-1 and oscilloscope makes a versatile mechanical measuring device for the experimental stress analysis field. Strain being a fundamental mechanical reaction, this equipment gives insight into all kinds of mechanical problems of function as well as strength. Vibration, damping, displacement, acceleration, pressure, weight, loads and stresses can be seen during actual operation.

Any kind of signal from static to high speed impact is declared to be faithfully reproduced. Calibration is



Ellis bridge and amplifier, Model BA-1

simple by a built-in system. Power is afforded by self-contained batteries. The BA-1 is a complete, portable unit ready to connect to gages and oscilloscope.

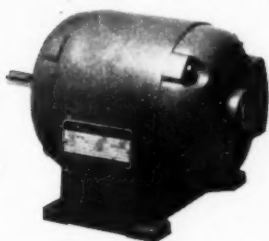
F-116—Capacitor Motor

A new tri-clad integral-horsepower capacitor motor for use wherever power supply demands single-phase operation is offered by General Electric's Small and Medium Motor Divisions, Schenectady, N. Y.

To minimize over-all dimensions, capacitors are mounted in the base of the motor, and there is no conduit box on the side. The conduit box has been

replaced by a built-in terminal board inside the end shield for easier wiring.

The compact new motor is said to weigh 15 to 20 per cent less than the old model. It has a totally enclosed



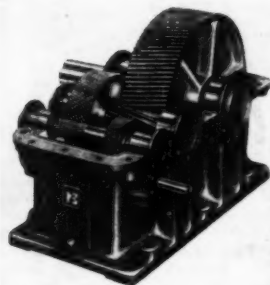
GE "Tri-clad" ball bearing open (drip-proof) integral-horsepower single phase capacitor motor typical of type KCS, 203, frame.

built-in starting switch to keep foreign matter from the contacts, and a completely new centrifugal mechanism.

In ratings from $\frac{1}{2}$ to 5 hp, these high torque motors are available in two types: Type KCS, capacitor-start, and Type KCR, capacitor-run. According to G-E engineers, these differ only in starting current, not in output characteristics. The Type KCS motor is designed for 115/230 volts, while the Type KCR motor is a single-voltage, 230-volt design.

Dynamically balanced for smoother operation, the motor features Tri-Clad motor triple-protection against namely—physical damage, electrical breakdown, and operating wear-and-tear. It has no brushes or commutators to interfere with radio or television.

F-117—Helical Gear Speed Reducer



Latest developments in parallel shaft enclosed helical gear speed reducing units are said to be embodied in the new line of Maxi-Power drives put out by Foote Bros. Gear and Machine Corp., Chicago, Ill. Forty-two sizes are available in single, double, and triple reduction types having standard ratios ranging from 2.08 to 1 up to 360 to 1, and capacities to 1,550 hp. Illustrations shows Foote Bros. Maxi-Power triple reduction unit, Type MT, with top cover removed.



For additional information please use coupon on page 54

F-118—Dial Type Strain Indicator

Used in stress analysis with SR-4 bonded resistance wire strain gages, an SR-4® self-balancing, dial-type strain indicator announced by the Baldwin Locomotive Works, Phila., Pa., simplifies strain measurement by giving quick indications of strains on a dial scale calibrated to read directly in micro-inches per in. for standard gages—gage factors from 1.90 to 2.20. Adjustments for gage factor and for zero setting are provided above the dial inside the case.

The indicator can be used either with a single strain gage or with multi-point switching and balancing units for reading many strain points. It is available with any one of three ranges, with any two, or with all three ranges: 0 to 2000, 0 to 5000, and 0 to 10,000 micro-inches of strain per in. of strained surface. Scales other than that illustrated are available.

Accuracy of the indicator is said to be high and permanent. It is guaranteed within 0.25 per cent of all ranges and is unaffected by the normal variations in the characteristics of electronic tubes used in the detecting and amplifying circuit, or by normal variations of voltage in the AC power supply.

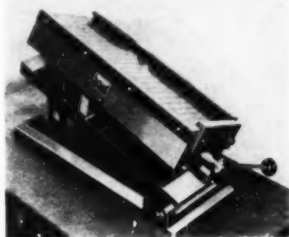


Baldwin self-balancing dial type strain indicator, type SR-4

F-119—Permanent-Magnet Angular Chuck

For use on production-type surface grinders a new 20 in. series of Magna-Sines offered by Omer E. Robbins Co., Detroit, Mich., has a permanent-magnet chuck measuring $7\frac{1}{2}$ in. deep by $20\frac{1}{2}$ in. long and can be used for either wet or dry grinding.

With the Magna-Sine in closed position, it is used as a conventional magnetic chuck for holding parallel work. For an angular job—either single angle or compound angle—it can be set up with standard gage blocks by the sine



New series of Magna-Sines offered by Omer E. Robbins Co.

bar method, thus for angular production work eliminating many special holding fixtures.

F-120—Air-Powered Electrode Dresser

Addition to the line of air tools for industry manufactured by The Aero Equipment Corp., Bryan, Ohio, is an air-powered electrode dresser.

Model 7165, lightweight, portable, and equipped with a cutter for reshaping copper electrodes on spot welding machines without removing the tips from the machines.

Potential users of these tools are motor car and aircraft companies, sheet metal fabricators, and especially users of multi-point welding machines. Cutting speed of 1200 rpm is said to be most satisfactory in dressing electrodes, and also a factor in increasing the number of electrodes that can be dressed in a given time with the tool.

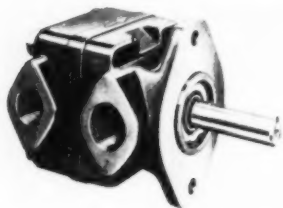
Combination of the correct angle on the cutter blade and the speed of the tool permit the blade to cut faster and at the same time to disperse chips. Cutters for No. 1 and No. 2 dome-type electrodes and No. 1 and No. 2 pointed



Aero air-powered electrode dresser, Model 7165

or tapered-type electrodes are available from stock; other types on special order. Height of the angle is $\frac{3}{4}$ in., overall length 10 $\frac{1}{2}$ in., free speed 1500 rpm., weight 3 $\frac{1}{2}$ lbs., pipe air inlet $\frac{1}{4}$ in.

F-121—Balanced Vane Pump



Vickers series V-200 balanced vane pump

Expressly designed for the mobile equipment industry, this new series V-200 balanced vane pump of Vickers, Inc., Detroit, Mich., automatically maintains correct radial and axial clearances at all times. Normal wear is said to be perfectly compensated, and the pump also automatically adjusts its clearances to oil viscosity variations resulting from temperature change. As a result, correct clearances are maintained and more oil is delivered for useful work.

"Hydraulic balance" is said to eliminate bearing loads resulting from pressure. The "Vane" principle provides for no-load starting—important in cold weather cranking. The V-200 pump is made in four capacities for operating pressures up to 1000 psi.

F-122—Compound Angle Vise

Announced by En Fab, Inc., Kalamazoo, Mich., is a compound angle vise for grinding, milling and drilling at all angles. It finishes any surface to size by grinding, it is said. Tool bits, form and dado cutters may be formed



Enfab compound angle vise

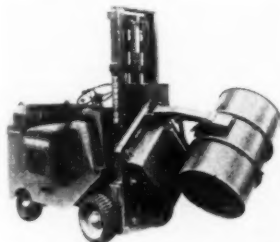


For additional information please use coupon on page 54

and sharpened by placing the work in this angle vise and positioning. Milling of all shapes may be accomplished by securely clamping the base of the vise to the mill, and regulating the compound swivels. Holes may be drilled in unusual locations by setting the compound angle vise so that the drill hits the surface at right angles. Such use is said to afford no problems when drilling bothersome oil and breather holes. To convert the swivel vise to a straight drill vise requires only the removal of four Allen cap screws.

The vise holds material up to 1 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. Slotted base size is 4 in. by 6 in.; overall height, 6 in. The unit swings 180 deg. in either direction, adjusted by socket head screws. Original set-ups may be made by the index, or for greater accuracy, by a surface gage.

F-123—Revolving Barrel Grab



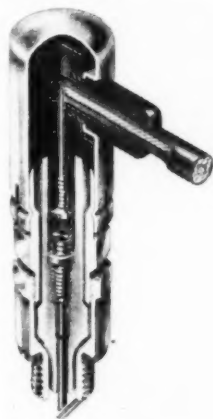
Latest fork lift truck attachment just released by Tawmotor Corp., Cleveland, Ohio is this hydraulically controlled revolving barrel grab designed to lift and transport open-end drums and to discharge their heavy contents. The device attaches to the lifting carriage of the truck. A revolving carriage permits the container to be completely revolved in either direction. With a lifting capacity of 2100 lbs the barrel grab is suitable for straight-sided drums from 15 in. to 30 in. in diam. To maintain constant pressure on the load throughout the 360-deg revolution, the hydraulic line operating the arms of the grab runs through the spindle of the carriage on the lift truck

F-124—Improved Cemented Carbide

Higher hardness, more wear resistance, and a more rapid dissipation of heat at the cutting edge are claimed for an improved No. 905 grade of cemented carbide put out by the Carboloy Co., Inc., Detroit, Mich. Used for finishing and light roughing cuts on nonferrous metals and cast irons with hardness up to Brinell 550, the new material is also said to be as easy to braze and grind as was the old Grade 905.

The improved No. 905 Carbide grade has been used successfully on such varied production jobs as automotive cylinder boring, piston grooving, tractor track roller boring, clutch pressure plate facing, camshaft bearing turning, etc. Indicative of the results being obtained is the precision boring of back bearing holes for crankshafts in alloy cast iron cylinder blocks in which tools tipped with the new No. 905 are said to be finishing 2000 pieces per grind—twice the number previously considered highly satisfactory.

F-125—Shielded Spark Plug



Leonard "Atomic-Flash" shielded spark plug

New and complete line of "Atomic-Flash" shielded spark plugs radically different in design to withstand effects of oil, water, dust and salt air has been brought out by the Leonard Spark Plug Co., Inc., Newark, N. J. For use in automobiles, trucks, buses, tractors, motor cycles, outboard, inboard engines, etc., the plugs are claimed waterproof, damageproof, shockproof and shielded against radio interference.

Installed with standard wrenches, these shielded plugs have high content aluminum oxide insulators, great sparking area, and a 200 per cent greater cooling area than conventional plugs, the company states.

(Turn to page 60, please)

WARD TELEVISION ANTENNAS MADE STRONGER, LONGER-LASTING, EASIER TO INSTALL with J&L STEEL PERMA-TUBE

J&L STEEL

The vertical mast and cross-arms of the Ward "Minute Man" antenna are made of J&L PERMA-TUBE. It takes just 60 seconds to remove the preassembled antenna from its box and swing all arms into position as shown here. PERMA-TUBE antennas combine strength, rigidity and rust-resistance—give longer trouble-free service—and better television reception.

PERMA-TUBE may be used for many applications where strength, rigidity, rust-resistance, and attractive appearance are necessary.

By using the new exclusive rust-resisting J&L PERMA-TUBE for the vertical mast and cross-arms in the "Minute-Man" series of television antennas, Ward Products Corporation, Division of the Gabriel Company, Cleveland, Ohio, builds in the following advantages:

1. Greater structural rigidity with smooth, attractive appearance. Greater strength to resist ice loads.
2. Clearer, steadier, television reception. Less vibration from wind.
3. No mechanical seam in Perma-tube to invite rust which would

reduce the torsional strength.

4. Ease and speed of installation . . . at less cost.

J&L PERMA-TUBE is a light-wall, electricweld steel tubing, coated inside and out with an exclusive plastic-type, weather-resistant finish. PERMA-TUBE can be furnished: bent . . . expanded . . . flanged . . . swaged or fluted.

J&L PERMA-TUBE for television antennas, costs less than any other tubing with comparable strength, rigidity and rust-resistance.

J&L PERMA-TUBE is not only

applicable to television antennas, but also wherever strength, rigidity and rust-resistance are important. It is available in all regular sizes and shapes of J&L Electricweld Tubing and in lengths up to 10 feet. Return the coupon TODAY for complete information on this new J&L product.

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me complete information on the new J&L STEEL PERMA-TUBE mechanical tubing.

Do you recommend PERMA-TUBE for

NAME _____
COMPANY _____
ADDRESS _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTIS-CLOY and ALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-129 Ball Bearings for Conveyor Systems

New Departure Div., General Motors Corp.—A new 16-page booklet is available, describing and illustrating five distinct types of New Departure self-sealed and lubricated-for-life ball bearings, designed for belt and trolley conveyors, foundry mold ear wheels, etc. Illustrations are line drawings with numerous photographs of installations with performance records. Included also are dimensional and load capacity data.

D-130 Dial Type Precisionaire

The Sheffield Corp.—An attractive, new catalog features the dial type Precisionaire. It illustrates and describes various models of this instrument and shows numerous typical applications. A table of specifications, capacities and ranges for four standard models, together with spindle adapter information, is included.

D-131 Material Handling

Lyon-Raymond Corp.—A 16-page

booklet, Material Handling—At the Machine, shows how proper "positioning" of materials saves unnecessary handling during production operations. It contains illustrations and descriptions of 12 different types of equipment of various manufacturers for "positioning."

D-132 Fire Extinguishing Equipment

Ansul Chemical Co.—An attractive, new 20-page fire extinguisher catalog illustrates the complete Ansul line. Included are improved Ansul Model B Extinguishers, piped systems, large stationary units, fire trucks, trailers, etc. Charts showing characteristics of approved hand fire equipment and comparative effectiveness graphs are included in the catalog.

D-133 Forge Furnaces

Eclipse Fuel Engineering Co.—Bulletin E-3, describes and illustrates the improved line of Eclipse Forge Furnaces. It also shows blowers, mixers, diluters and air control valves which

can be used in connection with the forge furnaces, and includes installation diagrams and specifications.

D-134 Aluminum Products

Aluminum Goods Manufacturing Co.—An attractive, two-color brochure, "Present and Future" describes and illustrates the wide range of products made before the war and for the war. A review of the company's complete facilities and the technical services made available, is included.

D-135 Charts for Optical Comparators

Jones & Lamson Machine Co.—An attractive booklet describes and illustrates the Jones & Lamson Comparator Charts, Radius Charts, Grid and Protractor Charts, Screw Thread and Standard Inspection Charts.

D-136 Centrifugal Pumps

The Duriron Co., Inc.—A revised instruction booklet on installation and operation of centrifugal pumps in corrosive service, has been issued. Friction data, formulae for figuring capacity, head and horsepower, and conversion data, are included in Bulletin 812A.

D-137 Automatic Circular Dividing Machine

The Gaertner Scientific Corp.—A new bulletin describes and illustrates a
(Turn to page 66, please)

TIME SAVER COUPON for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

**Readers Service Department,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.**

<p>Please send me:</p> <p>These FREE Publications</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on:</p> <p>New Production and Plant Equipment</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on:</p> <p>New Products</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>
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Your Name Your Title

Your Company Connection or Business

Address (Street & No.) (City) (Zone) (State)

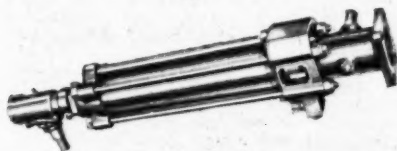
SOFT SHOULDER
or BLOWOUT
doesn't mean
Disaster



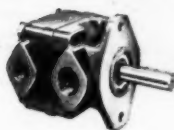
When You Have

VICKERS Hydraulic **POWER STEERING**

VICKERS
HYDRAULIC POWER STEERING
is Effortless, Positive, Shockless



Vickers Hydraulic Steering Booster with Integral Overload Relief Valve. Bulletin 47-30a.



Vickers Balanced Vane Type Pump is Engine Driven. Bulletins 36-12 and 49-52.

There's less hazard when forced off the road onto soft, rocky, rutted or snow banked shoulders . . . when you have Vickers Hydraulic Power Steering. The steering mechanism is hydraulically locked against any road condition reaction. The vehicle can't swerve from road reaction. There's no "wheel fight" to wrench the steering wheel out of the driver's hands. Pull-back onto the road requires only a trigger-pull on the steering wheel.

Vickers Hydraulic Power Steering is safer . . . effortless . . . provides hydraulic power at instant command of the driver to meet any steering requirements. This extra-quick steering increases the ability to maneuver in emergency. The driver is less tired, more alert.

Vickers Hydraulic Power Steering can be used as original equipment, or adapted to most trucks and other vehicles now in service. Write for Bulletins 47-30 and 49-52 covering further details and specifications.

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**ENGINEERS AND BUILDERS OF OIL HYDRAULIC
EQUIPMENT SINCE 1921**

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Sundstrand Magnetic Products Div., Sundstrand Machine Tool Co.—**W. W. Westlund**, formerly Advertising Manager of Rockford Magnetic Products Company, has been made Sales Manager of the Sundstrand Division.

Westinghouse Electric Corp.—**Marvin W. Smith**, President of Baldwin Locomotive Works, has been elected a director of the corporation. **Harry J. Deines** has been named Manager of Advertising and Sales Promotion.

General Electric Co.—**C. W. Bryant** has been appointed Purchasing Agent of the G-E Purchasing Department's Ferrous Products Div.

Studebaker Corp.—**David R. Osborne** has retired from his position as Sales Training Director of the corporation, after serving in that capacity for nearly 23 years.

Ford Motor Co., Ford Div.—**Carl T. Doman** has been appointed to the staff of L. D. Crusoe, Vice-Pres. & Gen. Manager. Mr. Doman will serve as staff member on forward products planning.

General Motors Corp., Oldsmobile Div.—**L. F. Carlson**, formerly general merchandising manager, has been promoted to Executive Asst. to the General Manager, **S. E. Skinner**.

The White Motor Co.—**Walter A. Vela** has been named Export Manager.

Willys-Overland Motors, Inc.—The newly created post of Director of Body Engineering will be occupied by **Edward C. DeSmet**.

Porter-Cable Machine Co.—The appointment of **John A. Proven** as Vice-President in charge of Sales, has been announced.

Borg-Warner Corp.—The appointment of **Ray P. Johnson** as Administrative Asst. to **G. A. Shalberg**, Executive Vice-President, has been announced. In addition to his new duties, Mr. Johnson will retain his post as Vice-Pres. of Morse Chain Co., a Borg-Warner subsidiary. He is a Director of Borg-Warner.

American Manganese Steel Div., American Brake Shoe Co.—**William C. Bruton** has been appointed District Sales Manager and **Robert H. Elem** made Pacific Coast Manager of the Welding Products Dept.

American Brake Shoe Co.—The appointments of **Harry C. Platt** as Vice-President of Engineered Casting Div.

and **William H. Starbuck** as Vice-President of the Kellogg Div., have been announced.

Simonds Abrasive Co.—Announcement has been made of the appointment of **F. R. Wilkes** as a Sales Engineer, with headquarters in Chicago and **K. R. Bartholomew** as Sales Engineer in the Eastern Penna. and Northern New Jersey territory.

Detrex Corp.—**Robert Lindley Murray** has been elected a Director of the Corp.

Adams Steele, Inc.—The appointment of **Winston I. Parks** as Research and Public Relations Director has been announced.

Ladish Co.—**Waldemar Naujoks** has joined the company in the capacity of Special Projects Engineer.

Yates-American Machine Co.—The election of **Wallace D. Johnson** as President of the company has been announced.

Airquipment Co.—**B. C. Monesmith** has been elected Asst. to the Vice-President in charge of Manufacturing, and **Dan J. Haughton** has been appointed President; **G. A. Fitzpatrick** has been named Works Manager. Airquipment is a subsidiary of Lockheed Aircraft Co.

Necrology

Cassius G. Selden, 63, vice-president, Detroit Harvester Co., died on Nov. 4 in Detroit.

Carter Carburetor Corp.—**A. C. Kerte** has been named Original Equipment Sales Mgr. of the Fuel Pump Div. He will have charge of sales of both mechanical and electric fuel pumps for original equipment. **I. E. Coffey** will give his entire attention to new devices which Carter has under development. **Ruluff Hollembeak** has been named Engineer, Mechanical Fuel Pump Div. **Alex N. Szwargulski** has been named Engineer, Electric Fuel Pump Div.

Northrup Aircraft, Inc.—**Jos. M. Druliner** has been appointed Chief Industrial Engineer.

Acm Steel Co.—The election of **Chester M. MacChesney** as Chairman of the Board, has been announced.

National Battery Co.—**W. C. Shull** has been appointed Asst. General Sales Mgr. for the Brand Div.

R. M. Hollingshead Corp.—**C. R. Ferris** has been appointed Treasurer.

Pick Brake Shoe Div., Pick Mfg. Co.—**Jos. Harwood** has been made Manager of the Division.

Vic Pastushin Industries, Inc.—**Jos. H. Moore** has been promoted to Plant Superintendent.

Inland Rubber Corp.—**James L. Hayes** has been made President of the Corporation. He succeeds **William M. Collins, Jr.**, resigned.

Lear, Inc.—Appointment of **Ray A. Ruge** as Chief Engineer has been announced.

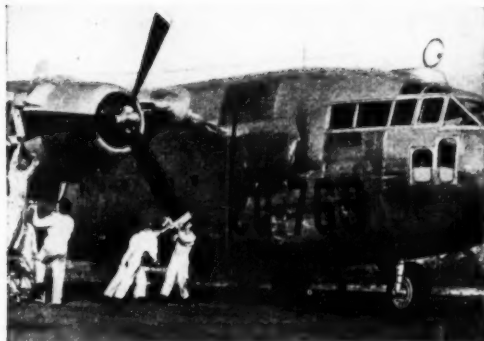
D-A Lubricant, Inc.—**Robert J. Binford, Jr.**, has been appointed Sales Manager.

CALENDAR

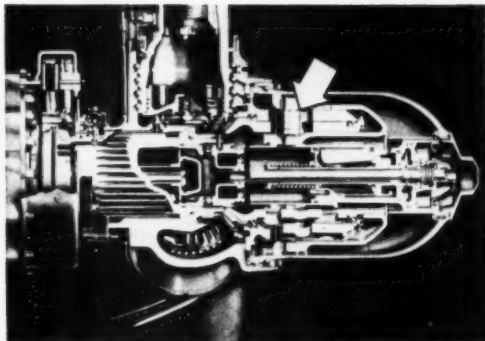
Conventions and Meetings

Inst. of Aeronautical Sciences & Amer. Helicopter Soc. Convertible Aircraft Congress, Phila.	Dec. 9-10
Nat'l Motor Boat Show, New York City	Jan. 8-14
Brussels Auto Show, Brussels, Belgium	Jan. 14
SAE Annual Mtg., Detroit	Jan. 9-13
Nat'l Soc. Plastic Engineers' Conference, Cleveland	Jan. 11-13
Plant Maintenance Show, Cleveland	Jan. 16-19
Nat'l Auto. Dealers Assoc., Atlantic City	Feb. 5-8
Nat'l Auto. Access. Mfrs. Assoc. Annual Expos., New York City	Feb. 6-10
Pacific Automotive Show, San Francisco	Feb. 16-19
Chicago Auto Show, Chicago	Feb. 18-26
ASTM Spring Mtg., Pittsburgh	Feb. 27-Mar. 3
Amer. Road Builder's Assoc., Cincinnati	March 6-9
SAE Passenger Car, Body & Production Mtg., Detroit	March 14-16
Geneva Motor Show, Geneva, Switzerland	March 16-26
Southwest Automotive Show, San Antonio, Texas	March 23-26
Nat'l Production Expos., Chicago	April 4-8
Amer. Soc. Tool Engineers Industrial Expos., Phila.	April 10-14
Amer. Society Lubrication Engineers Convention, Detroit	April 10-11-12
SAE Aeronautic & Aircraft Eng. Display, New York City	April 17-19
Metal Powder Assoc. Annual Metal Powder Show, Detroit	April 25-26
3rd Highway Transportation Congress, Washington	April 26-27
International Motor Show, Turin, Italy	May 4-14
Mid West Automotive Show, Chicago	May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis	May 18-19
A.S.T.M. Annual Mtg., Atlantic City	June 26-30

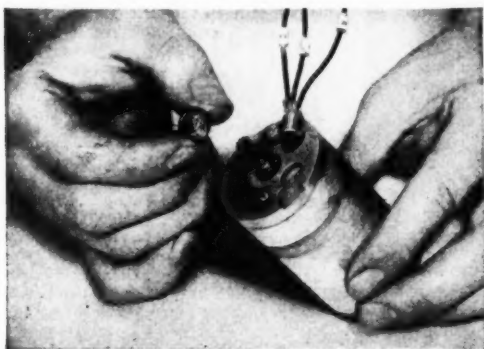
Torrington Needle Bearings provide maximum capacity in compact designs in Hamilton Standard propellers



Propeller Synchronization and pitch change mechanisms must be compact, yet absolutely reliable. In several applications, Hamilton Standard Division of United Aircraft Corp. uses Torrington Needle Bearings to secure high capacity, anti-friction operation.



In Cam Roller Assemblies (arrow) of Hamilton Standard Hydromatic propellers, Needle Bearings reduce friction to a minimum. The full complement of Needle Rollers provides the high capacity necessary to carry the heavy loads involved.



A Needle Bearing is also used on the drive shaft of an electric stepmotor. Here, the Needle Bearing reduces wear and helps to maintain proper mesh between the motor shaft and gearing in an electric head which controls operation of a Hamilton Standard Hydromatic propeller governor.



Space Limitations in this compact gear pump housing of a Hamilton Standard integral oil control assembly are easily met by Needle Bearings. With internal clearances accurately controlled in fabricating housings and shafts, this precision bearing insures close tolerance alignment of the motor pinion gear.

To secure smooth anti-friction operation in compact, high-capacity designs, use Torrington Needle Bearings. Our engineers will gladly lend a hand in design analysis and bearing selection. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices and distributors in principal cities of United States and Canada.



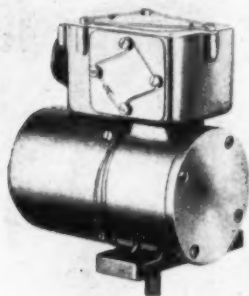
TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller

Straight Roller • Ball • Needle Rollers

S-16—Rotary Actuator

To position valves, program switches or sequence controls, and other aircraft accessory units, the Barber-Colman Co., Rockford, Ill., presents a new light-weight compact rotary actuator de-



Barber-Colman light weight aircraft actuator

signed to meet ANM 40. This actuator has features of radio noise filter and dynamic braking. The actuator can be controlled by inching switch, positioning rheostat, or by an automatic temperature sensitive bridge circuit. Powered by a 26-volt, 1.5 amp, DC permanent magnet motor, the actuator has a maximum torque of 50 lb in. and a maximum travel of 300 deg. Cam operated limit switches are accessible for the adjustment of the actuator travel before and after actual installation in the aircraft. Rigid mounting is provided by two drilled flange pads. Weight is 14 oz.

S-17—Landing Gear Position Indicator

For indicating the position of wheels, flaps, trim tabs, cowl flaps and other airplane components, two hermetically sealed aircraft instruments have been announced by the General Electric Co., Schenectady, N. Y. Available in two models, these new d-c selsyn position indicators have been designed to meet U. S. Air Force and U. S. Navy Specifications.

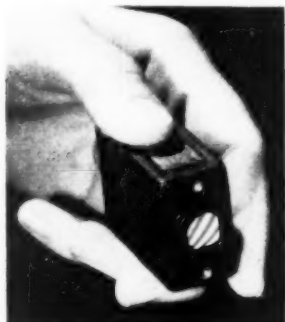
Model 8DJ51GAB is a new-type landing gear position indicator which can be used to replace the position lights now commonly used on aircraft. By changing the scale plate, this instrument can be used for other indications controlled by switches when an ON-OFF function is desired. The instrument is housed in a square case for panel mounting.

Model 8DJ48AAD, a round-case instrument, indicates flap position in an airplane regardless of the degree of flap



For additional information, please use coupon on page 54

travel. Modifications of this model can be furnished which indicate the position of trim tabs, cowl flaps, and other airplane components. The design of the



G-E landing gear position indicator, model 8DJ51GAB

instrument provides for an adjustment of the scale plate, through the hermetic seal, without breaking the seal. This makes possible the "setting" of the instrument scale plate to conform to the needed flap-travel indication of the particular airplane.

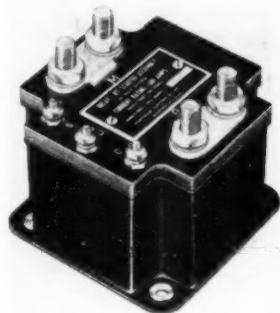
S-18—Jet Engine Starter Relay

For aircraft jet engines and for ground power plants a new starter relay is now in volume production at the Hartman Electrical Mfg. Co., Mansfield, Ohio. Designated the Hartman A-711C 600-amp jet starter relay, it is manufactured to AN3391 specification.

Totally enclosed in a lightweight aluminum alloy housing which provides mechanical protection from moisture, dust and fungus, the unit is designed for mounting in airframe with four screws. Terminals are located at front so that cables can be connected from any direction.

The starter relay has an intermittent duty coil. Contactor closes at less than

7.5 volts, holds in to below 3 volts. Standard setting is to close on inrush currents in excess of 100 amps, to drop out at 235 ± 15 amps. Manufacturer states that the pilot need only press starting switch momentarily, after which he is free to use both hands for other cockpit duties while engine is cranking. Also, if the pilot wishes to



Hartman A-711C 600-amp jet starter relay

stop cranking before engine is up to starting speed, a switch, usually provided in the supply line, may be opened by him.

S-19—Single-Electrode Spark Plug

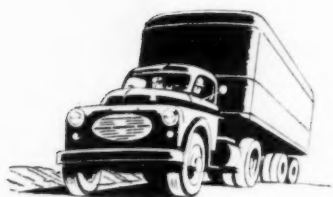
Announcement of a new CAA-approved aircraft spark plug is made by the Aviation Dealers Corp., Inc., Los Angeles, Calif. The new spark plug is the single-electrode automotive type claimed to cost approximately 50 per cent less than multiple-ground electrode plugs, giving a hotter spark in a con-



Decker D-26 aircraft sparkplug of the Aviation Dealers Corp., Inc.

centrated area, and being easier to adjust. Because it is of the separable type, cleaning and parts replacement is speedy.

Christened the Decker D-26, the plug is said to be more heat-resistant due to its aluminum oxide insulator which resists chipping, cracking, pitting and detonation. The heavy-duty electrode is of pure nickel.



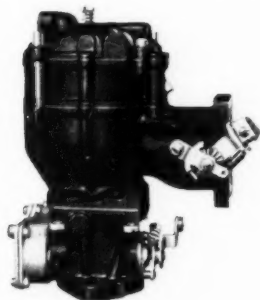
When Performance

Cannot be Compromised . . .



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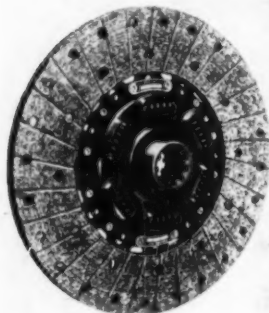
MANUFACTURERS OF FINE CARBURETORS AND FUEL FILTERS



F-126—Clutch Plates and Cover Assemblies

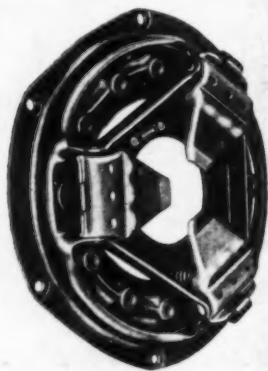
Auburn Clutch Co., Auburn, Ind., Division of Dana Corp., announces new additions to its line of interchangeable clutch cover assemblies and clutch plates. The cover assembly is a further development of the basic design used in the Army Jeep and in many cars, taxicabs, trucks and buses. The new sizes cover the 10½ in., 10¾ in. and 11 in. applications.

The Auburn clutch cover design is



Auburn heavy-duty clutch plate

recommended for heavy-duty service in ½- to 2½-ton vehicles. The chrome silicon pressure springs by not contacting the pressure plate, are said to run cooler and to last longer. Pressure springs are mounted in the cover bracket under each release lever where pressures are multiplied through multiple leverage of the release levers. The Auburn open design is said to provide maximum ventilation for heat dissipation.



Auburn interchangeable clutch cover assembly



For additional information, please use coupon on page 54

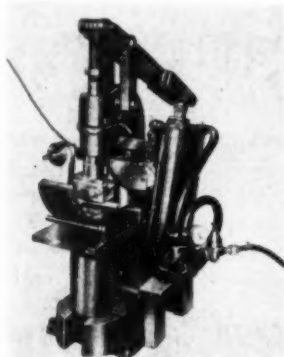
patron. A feature is addition of three pull-back springs connecting the outer ends of the release levers with the pressure plate, thus providing positive release.

Auburn truck plates, designed specifically for truck application, provide heavy forged hubs (tocco hardened), oversize long-life drive springs, large drive spring end buttons, and hardened and coined end button pockets. Cushion segments between the heavy-duty facings assure smooth engagement, and provide full contact area of the facings. Damper spring units in the Auburn clutch plate hub are designed to eliminate vibration and gear rattle.

F-127—Brake Block Marking Machine

The new Acromark No. 37 brake block marking machine, standing about as high as the average man, was developed by the Acromark Co., Elizabeth, N. J., to put a large trade mark and catalog number on high pressure molded brake blocks.

The brake block material being of extreme hardness and a printed or painted mark being unsatisfactory, the special



Acromark brake block marking machine, No. 37

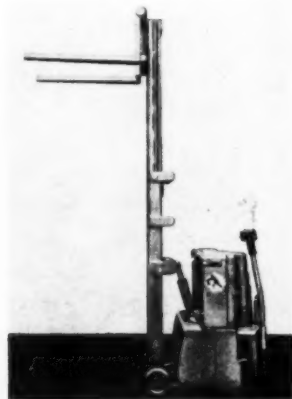
means of marking used incorporated a press delivering approximately 16,000 lb. pressure, an electrically heated and controlled marking die of exceptional hardness and tempering after engraving used in combination, produced a color pigment mark which was actually burned and embedded into the brake block.

The air press works from a standard 80 psi air line. The electric marking die heating controls may be plugged into regular lighting circuit. The automatic color pigment tape feed that feeds the pigment transfer under the heated die for each mark advances for the amount of a new impression at each stroke of the press. The press is controlled by a foot valve shown attached to a channel for crating in the accompanying illustration.

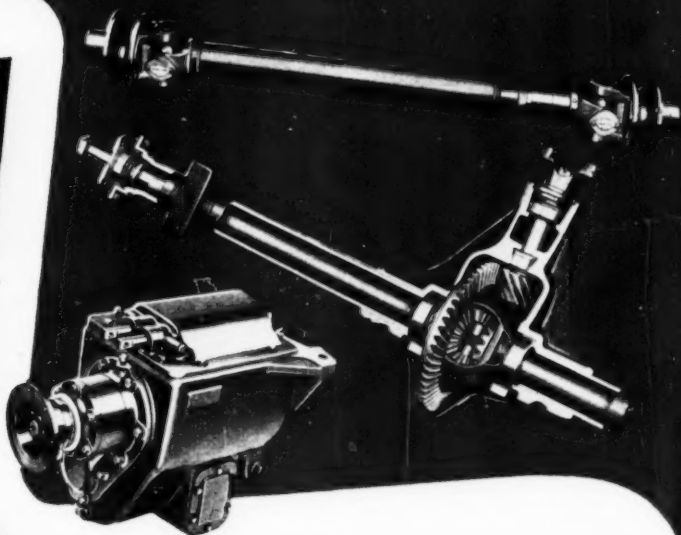
F-128—High Stacking Fork Truck

A compact JackStacker fork truck added to the line of "Master" JackStackers put out by Lewis-Shepard Products, Inc., Watertown, Mass., handles loads up to 1,000 lbs., 48 in. long. This most recent counterbalanced fork type Walkie electric truck designed for both horizontal and vertical movement of unit loads, is made in telescopic and non-telescopic models, with fork elevations up to 130 in. and a length of only 46½ in. less forks. A novel shaft mounting permits the forks to be quickly hinged back over the truck, thereby retaining the 46½ in. overall length when moving the JackStacker without load.

All controls are provided in the handle head. They can be operated with the handle in any position. The load can be raised or lowered while the JackStacker is moving. Sealed ball bearings and self-lubricating bronze bushings throughout require no lubrication and have no grease fittings.



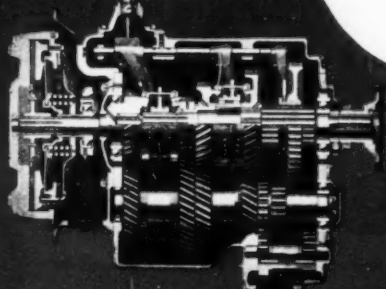
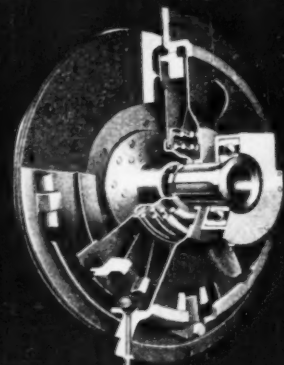
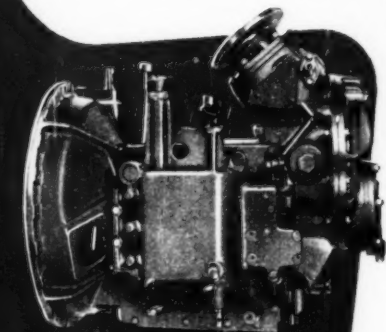
Lewis-Shepard 1,000 lb. capacity JackStacker fork truck



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 SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

New Techniques at Ford's Forge Plant

(Continued from page 39)

Following extrusion forgings are ejected through the back of the press and dropped onto a conveyor which carries them to the Toledo hot trim press. Forgings drop through the trim die onto a conveyor under the press and are carried to the adjacent Toledo or Bliss press for restrike.

Final operations include cold trim of stem, snag grinding, visual inspection.

Cycle annealing in a salt bath furnace, the other major development at Canton, is in production use on a selected group of parts including—countershaft cluster gears, rear axle ring gears, and the stem-type driving pinion. Forgings are introduced into the salt bath furnace right from the forging press or upsetter at a temperature of 1650 F. In some instances, if the tem-

perature of the work is below 1650 F when delivered to the anneal, the forgings are reheated in a slot furnace to the proper temperature.

The salt bath in the various furnaces is held at the sub-critical transformation temperature for the particular type of steel. At the present time forgings are produced from SAE 8620 and SAE 5135 alloy steels and the time cycle ranges from 40 to 60 minutes depending upon composition. For SAE 8620 salt bath temperature is held at 1190 F; for SAE 5135 steels, temperature is held at 1260 F.

Since the salt bath method provides close control of time and temperature, it is possible to produce a uniformly coarse pearlitic structure which is readily machinable. Apart from closer control the salt bath yields some major production economies, including a reduction in annealing time from conventional practice which requires a minimum of four to six hours to a maximum of as much as 24 hours. Another advantage of the salt bath is the ability to cool rapidly and produce forgings free from heavy scale. The latter operation is performed quickly and effectively by the simple expedient of dumping the basket load—as it comes out of the last stage of the salt bath—into a small water tank at the exit of the machine. This water quench takes only from one to two seconds and is effective in removing the salt as well as light scale.

Judging from present experience forgings made from SAE 5135 appear to have a more adhesive type of forging scale which resists removal in the water quench. For the present, therefore, parts made from SAE 5135 are routed to a big Pangborn barrel type shot blasting machine for scale removal.

Consider now the process for making ring gears. For this purpose they use SAE 8620 billets, 3¼ in. r-r square, sheared to length. The gross weight of the forging is 13.78 lb, net weight 10.84 lb. The square billets are heated to the forging temperature of 2250 F in a Budd automatic continuous induction heater. Work is automatically ejected and transported to the press on gravity rolls.

Forging is done in a 2500-ton capacity No. 25C Ajax forging press, using a three-step die—break, block, and finish. As the finished blank is removed from the die it is dropped onto a chute through the back of the press so as to reach the trim operator. Work is then trimmed and pierced in a No. 307 Bliss press. Forgings are transferred immediately to the adjacent Ajax salt bath furnace, loaded on the racks and fed through the automatic cycle. This job is timed for a cycle of about 40 minutes with the bath held at 1190 F. The water dip at the exit end takes about two seconds to remove salt and scale.

The driving pinion is typical of forg-

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Cooler

ings made in an upsetter. Billets are of SAE 8620 steel, handled in 1½ in. rounds sheared to 15½ in. Gross weight of the forging is 7.9 lb, net weight 7.63 lb.

Billets are heated to 2250 F in a Budd continuous induction heater, automatically ejected within reach of the operator. Forging is done in six passes in No. 4 Ajax upsetters—the first three passes being upset, the next two forming, and the last being a trim operation. Parts are then dropped onto a conveyor for transport to the Holden salt bath furnace where they are hand loaded into baskets.

At the extreme front there was an office; the main portion of the body formed a showroom, and at the rear was a modern kitchen and bathroom, entirely in aluminum alloy. While the lighting equipment was independent, it could be connected up to an outside supply, when necessary.

A similar propaganda vehicle was a

Panhard tractor with a semi-trailer equipped by the National Federation of Road Transporters for promoting road transportation. This will travel around France, reaching audiences which cannot be touched by any other means.

The construction of hydro-electrical stations in various parts of Europe has led to the production of heavy trailers for handling transformers and heavy forgings and castings. The most important of these is the Titan articulated trailer hauled by a 225 hp eight cyl Willeme Diesel tractor having two front steering axles. The entire outfit weighs 205 tons and is carried on 28 Michelin steel-carass tires.

Making use of American proprietary equipment, Panhard has produced a three-live-axle truck, carrying a useful load of six to nine tons, and capable of off the highway operation. A very rigid chassis frame carries a Panhard Diesel 100 hp engine. This drives through a five-speed transmission to a two-speed transfer box, which transmits the movement to an Eaton two-speed front axle, with Rzeppa universal joints, and to a Thornton take off (without reduction gear) operating the two Eaton two-speed rear axles. This gives 20 forward speeds and four reverse speeds. The change of gear in the three axles is made by an air operated servo mechanism. Braking is by a Westinghouse air operated servo device. A Jourdain-Monneret pneumatic servo assists the steering. The ratios give a speed range of 2½ to 44 mph at 2000 rpm.

Chenard & Walcker, a firm in the Chausson group, is making use of square section torsion bars, forming a pack, for both front and rear suspension of a front-wheel drive, 3000 lb delivery truck. While the number of bars is variable, according to load requirements, for this vehicle it is usually a pack of 49, each 0.28 in. square. Front attachment is by means of unequal length support arms, the torsion bar being mounted in the two arms of the upper support member and clamped at a central point. On being assembled, the two ends of the pack are spot welded. The rear axle is a load carrier only, but has a similar type of suspension with transverse-mounted packs.

Patents on a variable rate of flexibility are claimed by Gregoire, using inclined mounted coil springs. These have been adopted by Renault as supplementary to laminated springs.

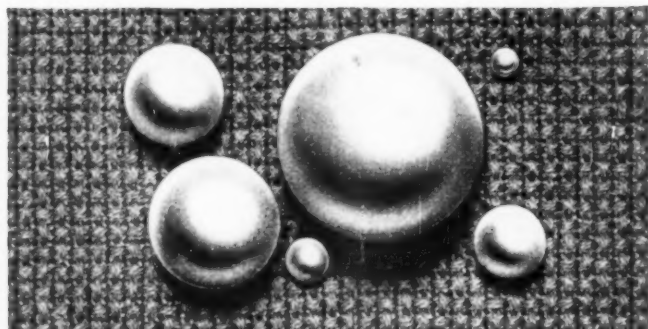
Variable flexibility is also claimed by Neiman with a system of endless rubber bands encircling a fixed point and the articulating suspension arm. As the three or four bands employed pro-

(Turn to page 66, please)

Second Paris Show for Trucks

(Continued from page 34)

a metal ball PROBLEM?



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Work It Out For You

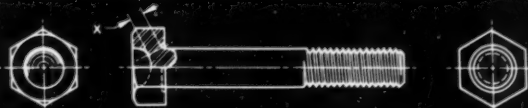


Whether it is a precision ball bearing or one of the other many ball applications in industry, your problem will not be entirely new. Strom has been in on many ball problems and knows the importance of the right ball for the job.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

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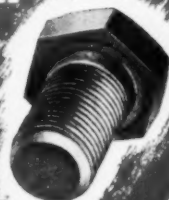


The "Place" type head is formed with a cup-like recess in its upper face and a circular recess in its under face adjacent to the shank. Between the radii of these recesses is formed a diaphragm (x) which acts as a spring element when the head is wrenched tightly against a rigid base.

U. S. Patent No. 1966044

DIAPHRAGM HEAD MAKES PLACE BOLT

self-locking against VIBRATION



Critical problems of fatigue and involuntary loosening on automotive, aircraft, farm equipment, and other products have been effectively met by *self-locking* Place Bolts.

The unique "diaphragm" head design (see illustrations) produces an axial spring tension when the bolt is tightened, giving it extraordinarily high vibration resistance. Place Bolts may be used with nuts or in tapped holes, but should be used only where

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Made of alloy steel, heat-treated to high physical properties, Place Bolts can be furnished in a wide range of sizes and may be developed for special applications. Typical examples include connecting rod bolts, main bearing cap screws, flywheel bolts and piston pin lock screws.

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Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 S. Garfield Ave., Los Angeles 22, Cal.

Second Paris Show

(Continued from page 64)

gressively come into operation, a progressive rate is obtained and oscillations are said to be more rapidly damped out than with coil or laminated springs. Up to the present this had been used chiefly on motorcycles and light vehicles, but it is being extended to heavier automobiles.

The use of single tires in place of duals has been extended by the introduction of the Michelin metallic carcass

tire. Produced on a small scale before the war, the metallic carcass was developed with synthetic, sometimes 100 per cent, when natural rubber was scarce, and is now ousting the fabric carcass for heavy-duty vehicles. Dunlop is meeting truck requirements with a nylon carcass.

While American trucks were few, units from the United States were strong with Buda, General Motors, White, Cummins, Hercules (built under license) and Gemmer steering gear. This last is now manufactured in France and has been adopted by half a dozen French truck or passenger car manufacturers.

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DONALDSON

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Publications Available

(Continued from page 54)

fully automatic machine for production ruling of precision circular scales according to any standard pattern of lines having industrial or scientific application. Method of operation and construction of the machine are briefly outlined.

D-138 Valves

Paul Valve Corp.—Paul high-performance Venturi-Ball valves are described in the company's new 16-page, 2-color Bulletin No. 103. The booklet is illustrated and covers principle of operation and engineering data, on "whistle" valves, bar stock valves, cast steel and stainless steel valves, etc.

D-139 Fastenings

Shakeproof, Inc., Div. of Illinois Tool Works—Fastening Analysis by Shakeproof is the title of a new, 12-page booklet which tells how better fastenings can reduce assembly costs. Brief case histories included in the booklet show typical economies that have been achieved through "fastening Analysis" in a variety of industries. Illustrations and descriptions provide many suggestions.

D-140 Cylinders—Air and Hydraulic

Hydro-Line Manufacturing Co.—A new catalog, designed to assist the engineer in selecting and specifying size and type of cylinder best suited for the job at hand, is made available by the company. It contains basic cylinder information with simplified tabulations of dimensions. Construction features for the various cylinders are included.

D-141 Materials Handling Attachments

Hyster Company—Attachments, tools and accessories are described in a new 28-page catalog. Model views, diagrams, specifications, action pictures, cartoons and explanatory text are used to tell about the features of the various special-purpose additions to basic materials handling machines.

D-142 V-Grooved Wheel Casters

The Bassick Co.—A new 8-page folder gives latest information on "V" Grooved-Wheel Casters for folder iron track. Photographs in the folder show the casters in actual use by different industries. Cross-sectional designs illustrate corner turns, turn-and-cross-over, and single and double switch installations of the track.

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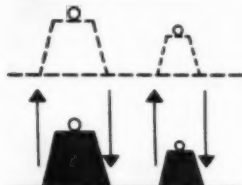
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Foreign Automotive Tariffs Lowered

(Continued from page 25)

agricultural machinery and implements. The Dominican Republic reduced the rate on sugar cane harvesting machinery and parts from 30 to 15 per cent, and bound duty-free treatment on agricultural implements, machinery and parts.

Nicaragua bound free of duty implements and parts used exclusively for agriculture, such as tractors, plows, harrows, seeders, cultivators, threshers, harvesters, machines for irrigating, and machetes.

Uruguay bound duty-free treatment on tractors for agricultural use, harvesters, and windmills.

Rubber Products

Sweden reduced to 12 per cent the duty on tire casings for assembly, and bound the existing specific rate on casings not for assembly, reserving the right to convert this duty to an ad valorem not higher than 25 per cent. Other rubber products on which the specific duties were bound or reduced (with a proviso for converting to ad valorem rates) were miscellaneous automobile parts of rubber, transmission and conveyor belts, and other manufactures of rubber.

Denmark bound a moderate duty on tires and tubes for automobiles, agricultural implements and tractors, and will accord duty-free treatment to such products suitable only for use on aircraft, as well as to unworked synthetic rubber or latex.

Finland established a 30 per cent rate on tires and inner tubes, and a 15 per cent rate on transmission and conveyor belts.

Italy reduced the rates on tires and tubes from the 1938 level by approximately a third, and granted rates on transmission and conveyor belts of rubber of 18 or 20 per cent, depending on type.

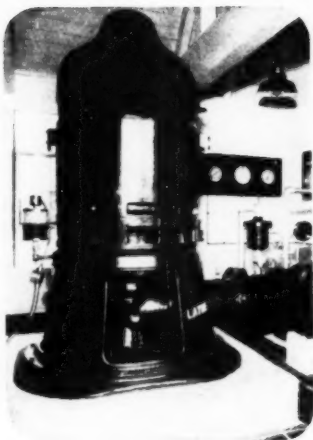
Greece made a substantial reduction in the rate on tires and inner tubes of all kinds, reserving the right to convert the present specific duties to ad valorem rates not in excess of 20 per cent on tires and 30 per cent on inner tubes.

Liberia bound the 20 per cent duty on tires and inner tubes, reduced by one-third the duty on rubber cements, tire sundries, repair materials and rubber and friction tape.

Haiti bound the duty on rubber tires and tubes at 20 per cent.

The Dominican Republic converted the duties on tires and tubes from specific to ad valorem rates of between 15 and 25 per cent, and bound these against increase.

Uruguay bound the existing rate on inner tubes.



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Layne's methods of building well water systems come from nearly three-quarters of a century of world-wide experience. Layne is acknowledged to have the "know how" that omits guess work, disappointment in needed volume and patch ups in construction errors by the less experienced. Layne systems, size for size, are built to, and actually do produce more water than can be obtained by the conventional type of installation.

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* Exclusive design protected by U. S. patent Nos. 1958725 and 2140818.

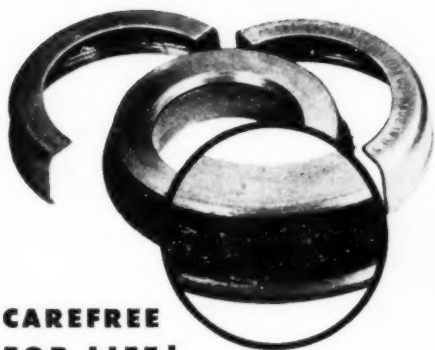


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- 2 Factory packed for life with the best lubricant known. Lubricant can't escape to clutch facings, never needs replenishment.

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Tested after 140,000 mile-service in a city driven car the bearing illustrated revealed no measurable wear, no loss of original lubricant. Smoothness or silent operating characteristics.

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Clutch Release Bearings are cost-cutting naturals . . . for the automotive manufacturer striving to cut assembly costs . . . for the vehicle owner bent on evading today's high repair costs.

Once installed, an Aetna Clutch Release Bearing is trouble-free, attention-free for vehicle life. Thanks to its patented design and self-lubricating feature there's no need for costly oil lines or grease fittings. Think what that means in increased assembling efficiency and lower assembly costs, in cementing the motoring public's good will.

Indeed, the Aetna Clutch Release Bearing is a good example of those dependable *little* things from which automotive vehicles get their dependability-bigness. Aetna Ball and Roller Bearing Company, 4600

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Aetna

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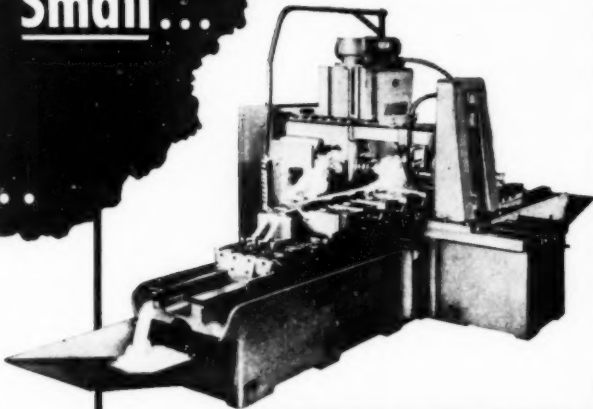
You'll get better Milling Methods with **SUNDSTRAND** "Engineered Produc- tion" and Equipment

Here are some representative examples of machine tools, equipment and services offered by the Machine Tool Division of Sundstrand. Standard basic machine designs and units, coupled with methods engineering assistance, has resulted in many cost-saving Sundstrand installations. In addition to the basic standard unit type machine designs, you will find various attachments and accessories to speed up operations. All have been time-tested and proven in past performance. If you have metalworking operations in your plant and are interested in lowering manufacturing costs, call in a Sundstrand representative. He'll be glad to assist you in obtaining more economical methods.

There is no obligation for this service.

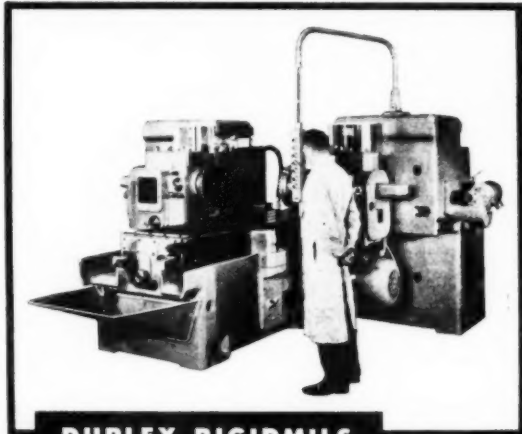


RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



SIMPLEX RIGIDMILS

Either slab or face milling can be performed on this single spindle Rigidmil. This type machine can be furnished with 25, 30, 40, 50 or 75 horsepower heads. Table widths are 18", 24" or 30" and table feed strokes up to 168 inches. Larger or special sizes are available on request.



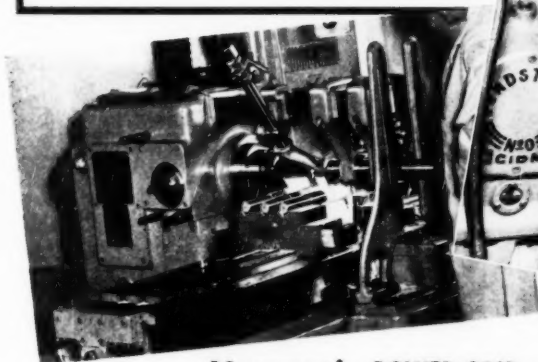
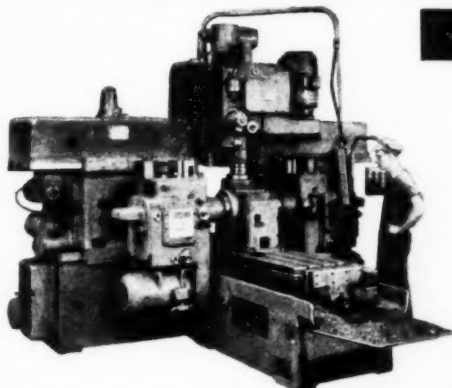
DUPLEX RIGIDMILS

Machine has two horizontal opposed independently motor driven spindle heads which can be furnished in 15, 25, 30, 40 or 50 HP capacities. Table widths are 18", 24" or 30" and table feed strokes up to 168 inches. Larger or special sizes are available on request.

Machine shown has spindle heads mounted on adjustable columns so as to handle a much wider range of work pieces. Power movement is provided for this column adjustment. A fixed column duplex type machine can be furnished if desired.

TRIPLEX RIGIDMILS

This highly productive Sundstrand Rigidmil has been developed to add flexibility to a production type milling machine so that both wide and narrow parts can be machined without sacrifice in accuracy. Three spindle heads, one vertical and two horizontal, can be adjusted to mill three sides of a work piece simultaneously or operate individually. Heads are independently motor driven and each can be furnished in either 15, 25 or 50 HP capacities. Machines can be furnished in table widths of 24" and 30" and feed strokes up to 168 inches with larger or special sizes available on request.



Magnetic POWER-GRIP Holding Methods and Devices

Illustrated above is a Model Rigidmil equipped with a Power-Grip Magnetic Fixture for holding three shafts for a keyway milling operation. Use of a magnetic fixture not only simplified and speeded up the loading operation but reduced the cost of the work-holding equipment over conventional holding methods. Magnetic fixtures are manufactured by the Sundstrand Magnetic Products Co. (formerly Rockford Magnetic Products Co.) which is now a division of the Sundstrand Machine Tool Co. Their Power-Grip Chucks are an easy solution to many work-holding problems. Their deep magnetic penetration eliminates the need for complex, expensive holding fixtures on either simple or odd shaped work pieces.

Write for bulletin number MC-290 on magnetic holding methods. Better still, send prints and specifications for our recommendations on Power-Grip holding equipment.

Additional Data

For more complete information on Sundstrand Simplex, Duplex and Triplex Rigidmils and Sundstrand Engineered Milling Methods, write for bulletins number 290.



Automatic Index Bases

Illustrated above is a standard Sundstrand Automatic Index Base mounted on a milling machine table. The base is provided with eight stations with two parts held in each station. Table cycling and indexing are automatic. Consequently, the operator merely loads and unloads two parts while two are being machined. Production is 800 pieces per hour. Standard Index Bases are available in sizes from 8" to 30" in diameter. For more information, ask for bulletin number IB-290.



SUNDSTRAND
MACHINE TOOL COMPANY

2571 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

Aluminum Alloy Semi-Trailer

(Continued from page 35)

While investigating the possibilities of light-weight materials in the tank-transportation field, the Butler Manufacturing Co., Kansas City, Mo., designed and built a three-compartment, all-aluminum, 5700-gallon gasoline transport semi-trailer. Arrangements were made with Aluminum Co. of America to make static-load tests on this transport.

The over-all length of the transport is approximately 35 ft. Shell thicknesses range from 0.156 in. to 0.203 in., and the thickness of the bulkheads is 0.172 in. Since these thicknesses are less than those specified by the Interstate Commerce Commission for a transport tank of this size, the use of the vehicle is limited to intrastate boundaries.

The tank proper was fabricated of 5S alloy and was welded throughout by using both the metal-arc and the shielded tungsten-arc methods. The total weight of the transport, with the tank empty, is 8385 lb.

Static tests were made with the

transport filled with water and supported on the king pin or on the jack pads. The loadings obtained in this manner were about 40 per cent greater than would be obtained by using a full load of gasoline. A pressure test was also made on one set of double bulkheads between compartments.

Strains were measured by means of Baldwin-Southwark SR-4 bonded wire resistance strain gages. These gages were used on both inside and outside surfaces of the tank. Deflections were measured either by means of dial indicators and reference bars, or by fine wires and mirrored scales. The discussion here is limited to a consideration of only the most significant of many results.

Fig. 1 shows the measured vertical deflections of the transport under a full 49,000-lb water load. The maximum measured deflection with the front support at the king pin was only 0.08 in.

The maximum measured longitudinal bending stresses along the top side ranged from only 2200 to 2400 psi compression. Along the bottom, the maximum stresses ranged from 4700 to 5200 psi tension. The highest values were measured in the relatively flat belly sheet of the front gooseneck section, immediately behind the king-pin bolster, and in the skirting members near the junction of the transition and gooseneck sections. Fig. 2 shows the distribution of several bending stresses that are of principal interest.

The maximum circumferential shearing stress measured in the sides of the tank was only about 1100 psi. Fig. 3 shows the stress distribution indicated on a section of high shear, behind the king pin.

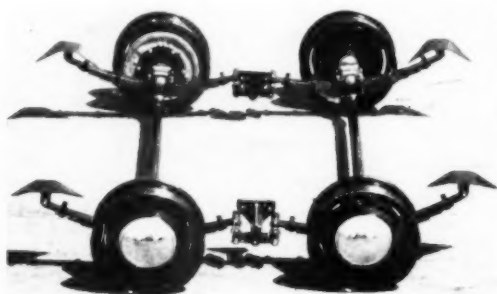
The maximum bending stress measured at the center of the hub section of the rear king-pin bolster was only about 3400 psi.

The auxiliary test of the stiffened dished bulkheads was made by applying pressure in the 1-in. space between the double heads separating the central and rear compartments. The central portion of the head under compressive stress buckled locally between stiffeners under an average pressure of about 5.3 psi but did not exhibit significant permanent set after the pressure was removed.

It appears from the foregoing stresses and deflections, as well as from other observations made, that the tank structure generally was conservatively designed and quite adequate to carry the intended loadings.

Although tests of this kind are useful in pointing out regions of high stress and in showing the applicability or limitations of design procedures, they do not permit an evaluation of the highly localized stresses that may cause failure in service. In an all-welded structure as complex as a modern gasoline transport, there are obviously many points of such localized stress. Their significance in design depends on their frequency of occurrence as well as their magnitude.

**Torq-less
Tandem
Axle
Assembly
by**



HAMMER BLOW TOOL CO.

*brings smooth riding
to Trailer Coaches with*

TUTHILL Alloy Steel SPRINGS

For smooth living on wheels, axles must be ruggedly constructed; springs capable of withstanding severe punishment during many thousands of miles of hard travel. Wide spring spacing permits lower floor-line, springs outside of body sills, greater road stability. Tuthill Alloy Steel Springs are preferred by leading manufacturers of heavy-duty motor vehicles.

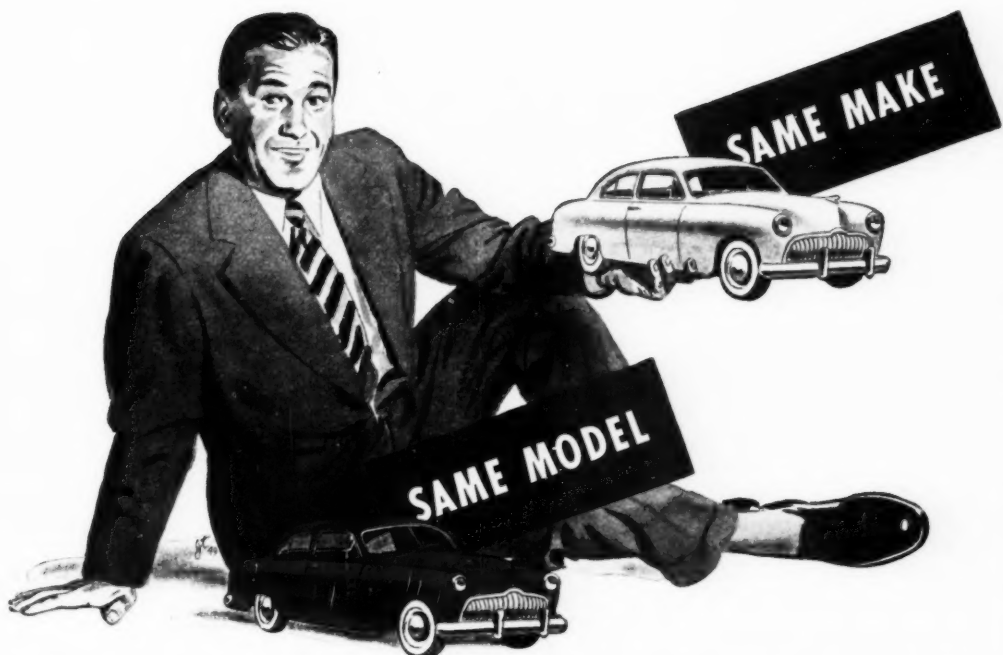
If you have a particular spring problem consult Tuthill's engineers. They are specialists. Tuthill Springs can be designed to meet your specific needs and requirements.



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details today*

TUTHILL SPRING CO.

760 WEST POLK STREET • CHICAGO 7, ILLINOIS



YET IN ONE, 30 POUNDS OF ALUMINUM DOES THE WORK OF 75 POUNDS OF STEEL*

Seeing these two autos speeding down the highway you couldn't tell them apart. Yet one is lighter, built better, will operate for less. The maker uses 30 pounds of aluminum where he once required 75 pounds of steel. He eliminates rust hazard and gives his customers eye-catching finishes that stay attractive through years of use.

Company executives have found the true cost of aluminum is finished cost in their product. Right from the start you get three times more metal to work with when you use aluminum instead of steel or other common metals. There's less weight to ship both coming and going. Many die maintenance problems are ended. Production figures show aluminum is easier to work. Sales figures show consumers appreciate aluminum's advantages.

Today aluminum is a whole family of metals. And

Reynolds *Lifetime* Aluminum is available in many forms to serve you best: pig, ingot, sheet, plate, wire, rod, bar, screw machine stock, pipe, tubing, structurals and extrusions. With them you also get the assistance of Reynolds technical service department on product redesign and production.

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A 162-page book with complete data on aluminum alloys and mill products. Free when requested on your company letterhead.



*Verified report from a major auto maker.



REYNOLDS *Lifetime* ALUMINUM

CONSIDER ALUMINUM...CONSULT REYNOLDS...THE COMPLETE ALUMINUM SERVICE

General News

(Continued from page 23)

New Application For Cincinnati Flamatic

One of the latest applications of the Cincinnati Flamatic hardening machine, mentioned at the National Metals Exposition in Cleveland, is a large unit designed for hardening cams and journals of a cast camshaft. The machine is installed in the plant of a major motor car producer and will be described in *AUTOMOTIVE INDUSTRIES* soon.



Here's your

LOW COST SOLUTION

to costly problems of
breakage, heat and wear

Centralloy piston ring pots and sleeves are specified by many engine manufacturers whose engines require heavy load capacities and high compression performance. You, too, will find Centralloy piston rings and sleeves outperform conventionally-cast ring and sleeve irons. Rings and

sleeves of Centralloy are normally unbreakable in service; retain full properties at 1000° F. upwards; and give thousands of miles extra performance at low cost operation. You will find, too, that these rough machined castings will eliminate costly operations and speed up production.

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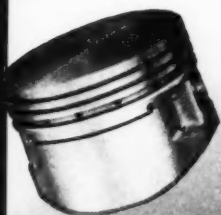
Centrifugally cast electric alloys — exclusively heat-treated for Super Duty

JUST FOR LAUGHS

Who says engineers have no sense of humor? This Rube Goldberg device was hatched out by J. A. Corriveau (shown in photo) and other GM Research engineers in a few hours following an open house of their laboratories. They concluded that the various exhibits shown to the public were rather awesome and complex and felt a light touch was needed. So they dreamed up this gadget, using the "drinking bird" toy as an activator. When the bird dips downward, its head interrupts a beam from the photoelectric cell. Relays click, red and white lights flash and the motor starts the pencil sharpener grinding. Note the conveyor belt to carry off sawdust and powdered graphite. The inscription on the display card reads: "For the first time a little bird has been put to work while he contentedly eats. He is very happy because in bending over to eat, he causes this machine to grind all day long on your pencils. Without a bird, this complicated mechanism developed by GM Research would be entirely useless".

Many Industrial Users of "VPI" Rust Prevention

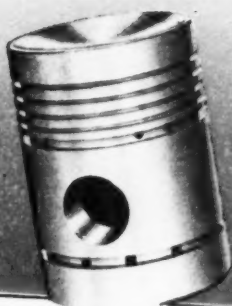
A patented volatile corrosion inhibitor called "VPI" (Vapor Phase Inhibitor), a vapor method of rust prevention, is now being used by many industrial companies. First discovered in the Shell Development Co.'s laboratories at Emeryville, Calif. in 1940, it is being made and sold by the Angier Corp., Framingham, Mass., under license by Shell Development. "VPI" is being currently tested or used by virtually every important manufacturer in the passenger car, truck, tractor, bus or aircraft industry. The Ford Motor Co. has carried on extensive research, and is currently using it in their export packaging. GM Research Corp. has carried on extensive experiments with "VPI" over a period of months, and has reported favorably on its rust preventive action, and is currently engaged in further tests on specific applications for several of their divisions. The GM Electro-Motive Div. is an extensive user. Chrysler, Nash, Packard, Willys-Overland, International Harvester, J. I. Case, Hyster, Thompson Products, General Electric, Carnegie-Illinois Steel Co., Jones and Laughlin Steel Co., Douglas Aircraft, Lockheed, United Air Lines and Pan American are among the nationally-known organizations either using "VPI" or actively engaged in testing it.



Air Craft



Nelson
Auto-Thermic



Diesel



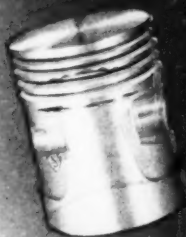
Trans Slot



IF-Slot



Heavy Duty



Wing Insert



Two Cycle



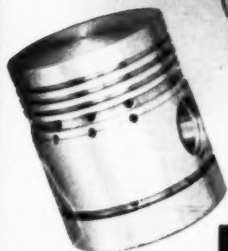
Steel Truss



Turbulator head



T-Slot



Trunk Type

Every Type Aluminum Piston
... *One* Standard of Quality

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Leaders in Aluminum Pistons
for 30 Years

Sterling Engineers will work with you as they have with other leading manufacturers in developing pistons to meet your exacting requirements. Wire or phone.



STERLING ALUMINUM PRODUCTS INC.

ST. LOUIS, MO.



Government Cars to Have "Decal" Identification

An improved identification "decal" for motor vehicles operated by agencies of the Federal government is being developed by the Government Printing Office. Initial order calls for 50,000.

Army Develops Mobile Laundry Unit

A mobile combination laundry and dry-cleaning unit has been developed by the Army Quartermaster Corps for use in the field. Mounted on a single

two-wheeled trailer, it weighs less than 7000 lb; can be transported by air; and contains its own power, heating and pressing components.

Libbey-Owens-Ford Announces New Safety Glass

A new glare and heat reducing glass, to be known as E-Z-Eye safety plate glass, for windshields, both flat and curved, and for sidelights in motor cars, has been announced by the Libbey-Owens-Ford Glass Co. E-Z-Eye safety plate glass has a slight bluish-green tint which is derived from the chemicals mixed with the raw materials at the

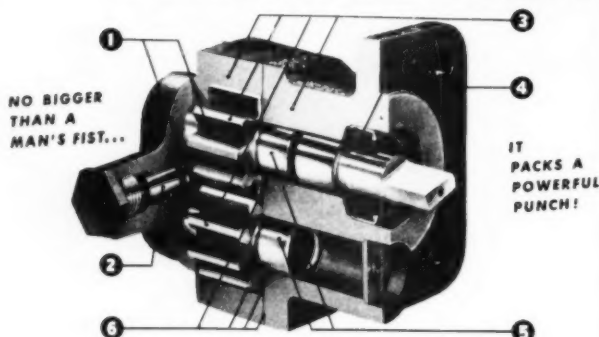
time the glass is made, enabling the glass to exclude infra-red rays of sunshine without distortion of vision, it was reported.

Only New Brunswick Plant of Delco-Remy in UEW

In an item entitled "Union Fight Poses Threat to GM," page 23, Nov. 15, 1949, AUTOMOTIVE INDUSTRIES, it should be noted that only the employees of GM's Delco-Remy Div. battery plant, New Brunswick, N. J., are members of the UEW; employees of Delco-Remy's other plants at Anderson and Muncie, Ind., comprising most of the division's employees, are in the UAW.

John S. BARNES

Constant-flo ROTARY GEAR PUMPS



*Outstanding Features
insure Superior Performance!*

1. **Identical Gears**, utilizing Barnes patented gear tooth construction. Finished to split-thousandths tolerances by shaving.
2. **Streamlined By-Pass Valve**. Maintains uniform pressure over wide speed ranges.
3. **Identical Materials**. A special heat treated alloyed cast iron used in main castings as well as gears assures peak performance over wide temperature ranges. All parts expand and contract alike to maintain close fitting tolerances.
4. **Spring-Loaded Seal**. Tight synthetic ring retains any oil getting past leak-back ports in bearings.
5. **Self-Lubricating, Long-Life Bearings**. Graphitic material, close limits, extra large surfaces insure durability and smooth, quiet operation.
6. **Close Fitting Tolerances**. Precision-tooled special mass production machinery holds close limits uniformly.

Learn about many other features and numerous applications of these exceptional pumps. Write for this Engineering Data Bulletin today.

JOHN S. BARNES CORPORATION
301 S. Water St., Rockford, Ill.

Compact, Efficient, HIGH QUALITY, Long-Life Oil Pumps

Smaller Hudson

(Continued from page 34)

Although the brake system remains the same, the redistribution of weight due to the rearward shifting of the powerplant makes it possible to use 1 3/4 in. width linings front and rear, the other models using two-in. linings on the front brakes.

With the rearward shifting of the powerplant the length of the propeller shaft has been reduced by four in. on this model.

Draw Forming

(Continued from page 43)

clature designations):

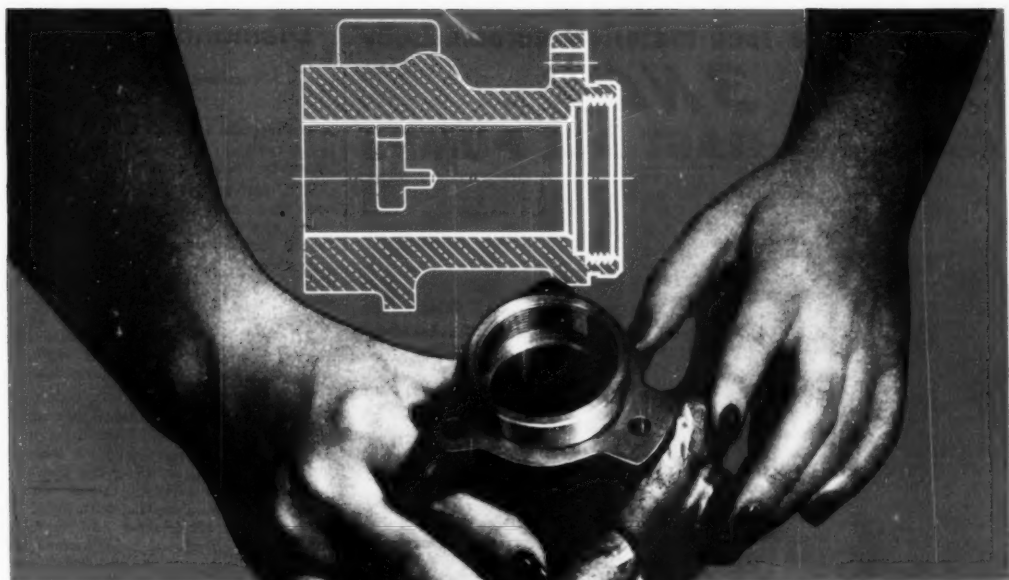
- R₁—Not less than 1/2 D.
- R₂—Included angles greater than 90 deg—1/2 D min; included angles less than 90 deg—1 1/2 D min.
- R₃—5t where D is less than 1 in.; 8t where D is greater than 1 in.
- R₄—3t where D is less than 1 in.; 8t where D is greater than 1 in.
- R₅ & R₆ equal to D.

5. Specify by the drawing that wrinkling is permissible in side walls and large flat areas away from mold lines or mating parts. For example: Wrinkles from 1/32 in. high by 3/16 in. min width to 1/16 in. high by 1/2 in. min width are allowable in areas not in contact with mating parts. Provide optional use of cups or bubbles to absorb excess material. See Fig. 7-C.

Classified Advertisements

WANTED: EXPERIENCED SALESMEN with good jobber distributor replacement sales background to promote full line of window channel, door hardware and rubber parts for top-rated, long-established midwest manufacturer. Will travel extensively doing missionary and jobber salesmen education work. Secure, well-paid positions for two aggressive men. Box 76, Automotive Industries, 5601 Chestnut St., Philadelphia 29, Pa.

Salesman with long experience selling truck and bus operators in the states of Pennsylvania, Delaware and Maryland, desires connection with manufacture of replacement parts or safety equipment. Box 71, 5601 Chestnut St., Phila. 29, Pa.



This

IS THE RESULT OF



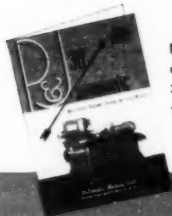
PRECISION TOOLING

— a pump housing, just as it comes from the P&J Automatic. Heavy lines in the drawing indicate the 17 exacting operations completed in record time with tungsten carbide P&J-engineered Tooling . . . boring, turning, facing, chamfering, reaming, threading . . . and a clever P&J multiple drill head setup for the three holes in the flanges.

The machine? It's the P&J 3U Speed Flex — smallest of the line of P&J Automatic Turret Lathes — which takes very little floorspace . . .

operates with 48 changes of speed from 72 to 1420 rpm for the class of work up to 6" diameter . . . and features fully automatic operation to take fullest advantage of ingenious P&J Tooling.

Even if your work is beyond the 6" class, the skill and know-how of P&J Tooling specialists can work out a profitable tooling setup. Send us a sample part or prints, regardless of size, to prove how P&J Tooling will produce more quality parts with fewer rejects, at lower cost.



If your quantity production is within the 6" class, you will want this Bulletin on the P&J 3U Speed Flex Automatic. Just write for it on your Company letterhead.

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EXAMPLES OF
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Used on ...
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(Reversible Air Motor)

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Drive of Fuel
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Production Line
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Demonstrator for
Simulating Auto
Manifold Vacuum

**HAVE YOU A NEW
APPLICATION?**

To feed materials automatically

3 NEW GAST AIR PUMPS



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VACUUM
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Single Chamber Model
3040—19 to 24 c.f.m.



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3 NEW AIR
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These 3 new Air Pumps offer: Both strong "blow" for separating—and large capacity vacuum for "pick-up" of materials on automatic feeding of paper, cardboard, thin metal, acetate, etc. Gast Rotary Design produces large volume per h.p. at lower speeds. V-belt drives make installation and speed control easy. Get details—remember, "Air may be your Answer!"



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(10 ONE H.P.) (10 TO 10 H.P.) (10 TO 10 H.P.)
GAST MANUFACTURING CORP., 129 Mackley St., Boston Harbor, Mich.

Diamond T Trucks

(Continued from page 37)

A cover plate is provided in the floor for inspection and easy filling of the hydraulic brake master cylinder.

With respect to transmission options, note that the Warner T98 is a four-speed synchromesh unit. The Clark 205VO transmission is of five-speed type with direct in fourth, overdrive in fifth. Access to transmissions for inspection and service is afforded by the use of a large heavy gage cover. The front body cross member is made of three sections with the center section arranged for removal to allow disassembly of the transmission.

Many special equipment options and accessories are offered in this line, including an Evans heavy duty hot water heater and defroster using the Evans "double" fan and bus-type motor. This is available in combination with an all-weather fresh air heating and ventilating system developed by Diamond T to afford driver comfort in all kinds of weather—winter and summer.

Axle options are noted in the specifications, the important point to note being that heavier GVW or gross train ratings can be specified only when oversize axles are installed. For example, the installation of an oversize engine and transmission does not change rating unless the heavier axle also is used.

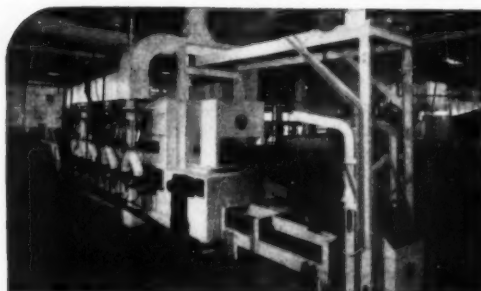
In connection with engine options it should be noted that the optional engines on 420 models are offered only for tractor service, the JXD being supplied only in combination with the T98 or 205VO transmission and oversize clutch. On the Model 520 chassis the JXLD is offered only for tractor service and is supplied only in combination with the 205VO transmission and 12-in. Lipe clutch. On the other hand, the JXD engine is available on 520 models when specified in combination with optional transmissions and oversize clutch. Similarly the JXLD engine is available for all 620 models in combination with the 12-in. Lipe clutch.

The cab assembly is composed of five major sub-assemblies which are bolted together to preserve good alignment. Seats are of all steel spring construction, the driver's side being of deluxe type with straight helical springs individually pocketed in jute. The seat cushion bottom has a chip board air damper with air escape holes.

Windshield wipers are heavy duty American Bosch electric type, with arms and blades of stainless steel.

Fenders are composed of three individual stampings bolted together, permitting replacement of individual sections in the event of damage.

The instrument panel is a heavy gage stamping bolted in place to permit removal for service. The instrument cluster also can be removed as a unit.



LOW COST HEAT TREATMENT of small and medium size parts

• EF chain belt furnaces are the most satisfactory heat treating equipment yet devised for carbon restoration, scale free hardening and hardening without decarburization of small and medium size parts. Built in 11 standard sizes for capacities up to 2,000 lbs. per hour. Larger sizes to meet any requirement. Gas-fired, oil-fired or electrically heated, whichever best suits your particular requirement—and location. Estimates of equipment, installation and operating costs—and samples of treated parts—furnished promptly. Write for literature.

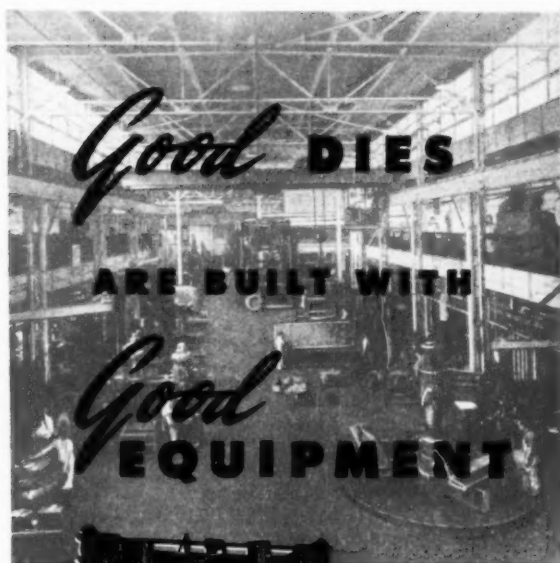
EF GAS-FIRED OIL-FIRED and ELECTRIC FURNACES

for

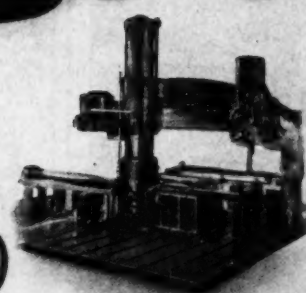
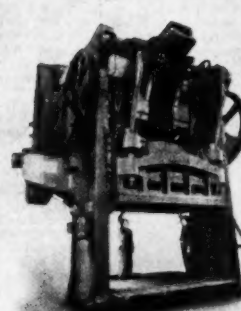
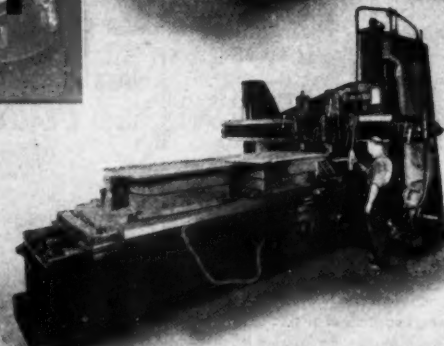
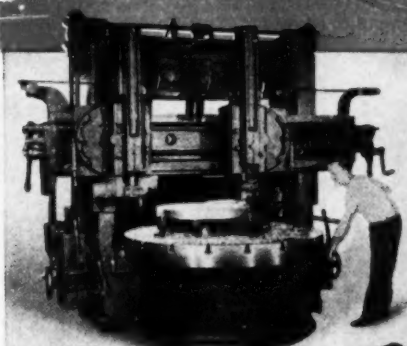
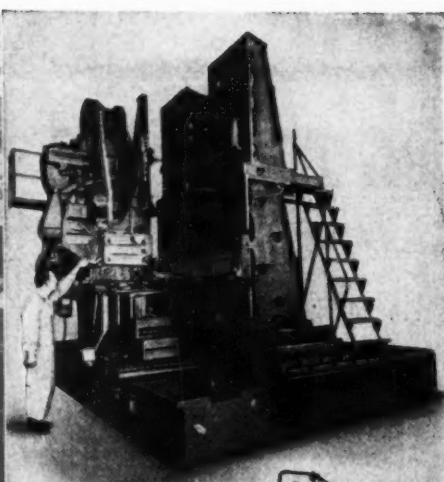
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THE ELECTRIC FURNACE CO.
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ARE BUILT WITH
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A quarter-of-a-million-dollar battery of duplicating machines represents only a small portion of the modern equipment in use in Allied's Richard Brothers Division plants. Here is every facility for the manufacture and try-out of sheet metal dies of practically every size and type. Here, too, are the men who know how to use this equipment—men with years of experience and proven ability in die-making. When Allied equipment and manpower go to work for you, you can be sure of maximum production and economy in your press operations.



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DEPARTMENT 49

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SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC
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... PROTECTIVE PACKAGING
For Your Machinery
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Regardless of whether it is an Export or Domestic product... when you want to protect your equipment, **COCOON** is by far the most modern form of packaging for precision equipment!

Here you see an employee spraying the protective web-like **COCOON** on such a piece of equipment. This man could very well be your employee, for all the ease with which **COCOON** is applied.

Applied with a standard spray gun, **COCOON** provides a simple, extremely fast means of packaging parts, assemblies, or complete machines, regardless of size or complications in shape. Equipment packaged in this way can be stored in the open indefinitely, secure against snow, rain, wind, sun and humidity. How well this fits into your export and domestic shipping container program!

Whatever your protective packaging problem may be—whether it involves lathes, farm equipment, household appliances, metal surfaces or huge generators, **COCOON** meets your need. Protect your product with **COCOON**. Write COCOON ENGINEERING SECTION today.

COCOON

Reg. Trade Mark



Hollingshead
CORPORATION

Camden, N. J. Toronto, Ont., Canada

LEADER IN MAINTENANCE PRODUCTS

Business in Brief

Written by the Guaranty Trust Co., New York. Exclusively for AUTOMOTIVE INDUSTRIES.

Business activity in general increased slightly during the week ended Nov. 5. Department store sales, electric power production, and crude oil output were higher than in the preceding week, while railway freight loadings, bituminous coal production, and construction declined. The *New York Times* index of activity for the week ended Nov. 5 stands at 123.6, as compared with 122.6 in the preceding week and 122.4 a year ago.

Sales of department stores during the week ended Nov. 5, as reported by the Federal Reserve Board, equaled 214 per cent of the 1935-39 average, as compared with 298 in the week before. Sales were two per cent below the corresponding distribution a year ago, as against a preceding decline of seven per cent. The total in 1949 so far reported is six per cent less than the comparable sum in 1948.

Electric power production increased contrasessionally during the week ended Nov. 5. The output was 2.3 per cent below the corresponding amount in 1948, as compared with a decline of 2.2 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 578,981 cars, 2.1 per cent less than the figure for the week before and 31.4 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Nov. 5 averaged 5,135,600 barrels daily, 60,450 barrels more than in the preceding week but 539,450 under the comparable output a year ago.

Production of bituminous coal and lignite during the same week is estimated at 2,650,000 net tons, 90,000 less than the output in the week before and 8,024,000 below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Nov. 10, according to *Engineering News-Record*, was \$111,289,000, or 34 per cent less than the preceding weekly figure and 19 per cent below the comparable sum in 1948. The total recorded for 45 weeks of this year was 16 per cent more than the corresponding amount in 1948. Private construction for the period was 14 per cent above that a year ago, and public construction increased by 17 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Nov. 8, at 151.5 per cent of the 1926 average, was 0.1 per cent more than in the preceding week but 7.8 per cent below the corresponding figure in 1948. Advances were registered in all major commodity groups, with the exception of fuel and lighting materials, which declined, and chemicals and allied products, which showed no variation.

Member bank reserve balances decreased \$292 million during the week ended Nov. 2. Underlying changes thus reflected include declines of \$231 million in Reserve bank credit and \$51 million in gold stock and an increase of \$146 million in money in circulation, accompanied by decreases of \$130 million in Treasury deposits with Federal Reserve banks and \$6 million in Treasury cash.

Total loans and investments of reporting member banks declined \$91 million during the week ended Nov. 2. An advance of \$19 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$13,699 million, shows a net decrease of \$1734 million in 12 months.

**Make this note
on your Xmas List:**

**(X) marks
a Quality
Xmas
Gift**

All through the dazzling displays, from toys to TV sets, you'll see . . . time and time again . . . the familiar face of the American Phillips Cross Recessed Head Screw. And whenever you see it, you're looking at a top product in its line . . . one that's obviously an exceptionally good buy because it's put together to stay, to withstand vibration and strenuous daily use. What's more, you can be sure that the lucky one who gets your gift *will see it the same way.*

Yes, American Phillips Screws are one of the most reliable outward signs of built-in quality. And if *you* are concerned with the manufacture of any product, then you may well have a far happier New Year in store for you, if you will let us show you how . . . in your own plant as in all others . . . *American Phillips Screws always cost least to use.*

AMERICAN SCREW COMPANY, Main Office: Providence 1, R. I.
Plants at Willimantic, Conn., and Norristown, Pa.
Warehouses at: Chicago 11: 589 E. Illinois St. Detroit 2: 502 Stephenson Building

**AMERICAN
PHILLIPS** *Screws*



ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

**4-WINGED DRIVER CAN'T SLIP OUT
OF PHILLIPS TAPERED RECESS**



Do you have METAL SURFACE TREATMENT PROBLEMS ?

Here are **PARKER** products to solve them

All of our work is on the surface! For 34 years we've lived with the problems of metal surface preparation and preservation. Parker research has discovered how to deal with many specialized problems; field experience for three decades and in thousands of plants has taught us many answers, too. Parker Rust Proof Company's vast experience, and the famous Parker Products, are at your command to solve *your* metal surface treatment problems.

Want to inhibit rust? ...PARCO COMPOUND



This is an improvement on the original Parker Product, which has set the standards for controlling rust on iron and steel for more than thirty years. Parco Compound converts the surface of these metals to a nonmetallic phosphate coating that is highly efficient in inhibiting the forces of corrosion. It's an easy, positive treatment, requiring only simple equipment.

Parco Compound treats small and large pieces with equal ease. The characteristic color produced by Parco Compound is soft, dark gray. Parcolacs, paint, oils, stain, or wax finishes are used over this versatile rust inhibitor.

Want rust preventive finishes? ...PARCOLACS



This large class of specialized products includes waxes, stains, and oils of varying characteristics to meet the many different requirements of industry. There are Parcolacs for dip application, for centrifuge, for brushing and spray. You can get high

efficiency in Parcolacs for use as rust preventive finishes; others have been developed to add pleasant, non-marking, high appearance qualities. Your own requirements will dictate which Parcolac is best for your use.

**Want improved paint adhesion
and rust resistance?**

... BONDERITE



Most widely used of all Parker Products, Bonderite adds quality to many of the most attractive metal products manufactured today. It's under the paint on automobile bodies, fenders, and sheet metal. It is used by most refrigerator manufacturers, and on a great many of the finest domestic appliances. Wherever lasting fine appearance is important on a painted metal product, there is a place for Bonderite.

Bonderite converts the surface of metal to a non-metallic phosphate coating which is an excellent base for paint and, because of its nonmetallic character, an effective rust resistant.

Bonderite is fast and flexible, and can be used in immersion equipment and in automatic conveyor production lines. It is simple to control, producing positive and uniform results at low cost.

**Want faster,
smoother draws?**

... BONDERITE



The crystalline, nonmetallic Bonderite coating brings these benefits to the drawing bench: It holds lubricant, even under great pressure. It prevents metal to metal contact, reducing galling and scoring. It reduces wear on tools and dies, lengthening

the life of these expensive parts. It permits deeper, smoother, faster draws. *Cuts metal polishing costs.*

**Want wear resistance
for friction parts?**

... PARCO LUBRITE



Faster, smoother break-in, greatly reduced danger of scoring and scuffing, and longer subsequent wear are the advantages Parco Lubrite brings to friction parts. The nonmetallic, crystalline coating holds oil under high operating pressures and temperatures. There's no metal-to-metal contact, and the parts "wear-in" quickly and smoothly.

**Want better metal cleaning
and rust removal?**

... PARCO Formulated CLEANERS

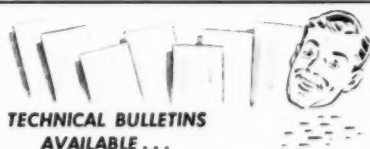
Parco Cleaners are formulated to clean better, go farther, with reduced concentrations of cleaner material required. These products do more than remove rust, soil, or grease; they also *condition* the metal for the next step in finishing.

Parco Cleaners include *Solvent and Emulsion Types, Acid Types, Alkaline Types, and Water Conditioners.*



**TECHNICAL BULLETINS
AVAILABLE...**

Full information on any of these Parker Products is yours on request. Write for technical bulletins on the Parker Products which can contribute to the solution of your problem and the success of your product.



Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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2178 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces



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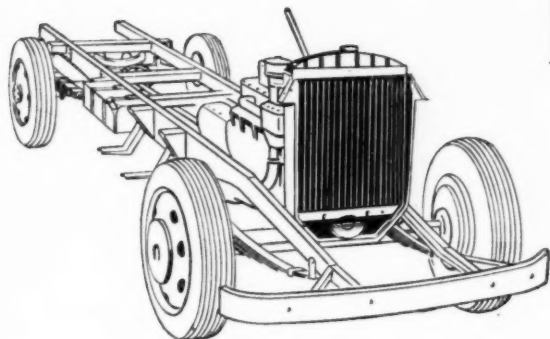
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ASSOCIATED SPRING CORPORATION
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MECHANICAL
SPRINGS

MECHANICAL SPRINGS

For **Higher** efficiency...
and **Lower** costs...have the
cooling system engineered
by
HARRISON



HARRISON

Harrison Radiator—with its complete testing laboratories, extensive field experience, and unequalled manufacturing facilities—enables automotive manufacturers to increase the effectiveness of cooling systems and—at the same time—to cut costs.

When a manufacturer of cars or buses, trucks or tractors, presents a problem, Harrison completely engineers the cooling system. It considers fan location, shrouding of the radiator core, restrictions to air movement, size of fittings, method of core mounting, and all other factors affecting performance. By assuring maximum efficiency, the completely engineered cooling system minimizes the size and weight of the core, with corresponding savings in costs of core, mounting, and parts.

Manufacturers are invited to avail themselves of Harrison's resources and facilities to solve any cooling problem, promptly and economically. Harrison Radiator Division, General Motors Corporation, Lockport, New York.

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IT'S THE ROAD TO SUCCESS...

THE
FAMOUS
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OF
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NEEDLE BEARINGS
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FOR THE AUTOMOTIVE INDUSTRY

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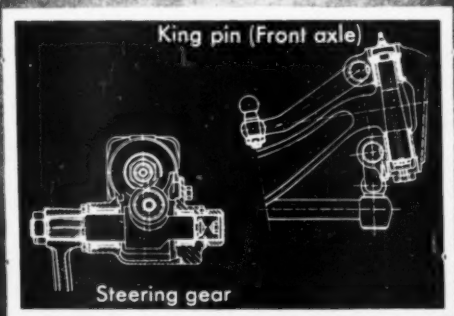
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Special details on request



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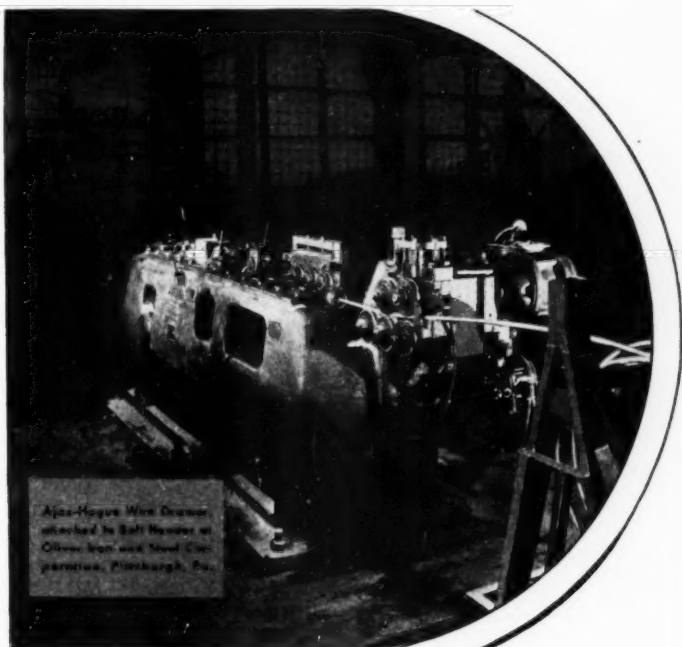
133 & 137 BOUL^d NATIONAL

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RUEIL-MALMAISON (S.O.) FRANCE

ACTA

**all
types
of
cold
headers
should
have**



Ajax-Hogue Wire Drawer
attached to Cold Header at
Oliver Iron and Steel Com-
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AJAX-HOGUE WIRE DRAWERS

The Ajax-Hogue Wire Drawer . . . a simply installed attachment for cold headers . . . cold draws, coats and supplies the heading machine with clean, accurately round wire. Substantially longer header die life, lower raw material cost, and improvement in the quality and accuracy of the product are important money saving advantages gained by the use of Ajax-Hogue Wire Drawers. No matter what makes of headers you operate or how many, you can improve cold heading efficiency with Ajax-Hogue Wire Drawers.

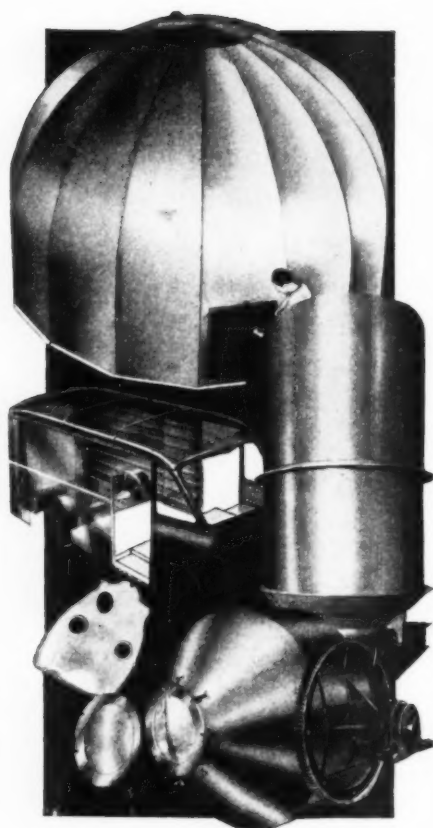
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$\frac{3}{4}$ " x 6" machine bolt
headed by double ex-
trusion method from
Ajax-Hogue drawn wire.

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*When it's gotta fit . . .
Brandt measures up!*



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for mass production of
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SAVES TIME AND DOLLARS

With Brandt's complete, versatile organization of skilled workmen and experienced engineers.

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Several hundred thousand square feet of streamlined production equipment, strategically located for high speed, mass production to all parts of the country.

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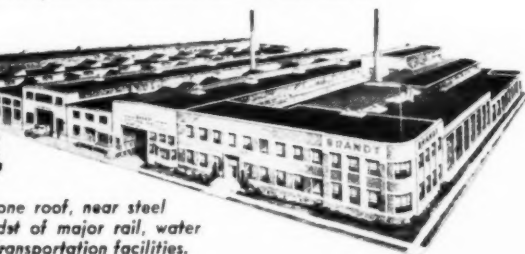
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F. O. B. BALTIMORE TO DISTANT ASSEMBLY LINES



*All under one roof, near steel
mills, in the midst of major rail, water
and highway transportation facilities.*



You can't raise Gross Limits —

but you can increase payloads with Stainless Steel construction



U-S-S Stainless gives you ...

**BIGGER PAYLOADS • LONGER LIFE
LESS MAINTENANCE
BETTER-LOOKING EQUIPMENT**

GROSS LOAD LIMITS are inflexible ... the lowest load limit on your route determines the maximum weight of your truck for the entire run. But you can make sure that the greatest possible amount of your gross is *payload* by operating Stainless Steel trailers.

Compared with other materials, Stainless Steel effects almost unbelievable *savings in weight* while actually increasing the strength of the unit. This is possible because of Stainless Steel's high strength and superior corrosion resistance.

In many operations, weight restrictions prevent the operator from

taking full advantage of length allowances. With Stainless Steel construction, it is often possible to operate a longer unit—with greatly increased cubic content—and still stay within the weight limits.

In addition to bigger payloads, Stainless Steel gives you much longer life than ordinary materials. Stainless is immune to the destructive action of corrosion, weather and time

itself. No painting is necessary and maintenance is reduced to an absolute minimum. And don't forget the advertising value of Stainless equipment's permanent good looks.

When ordering Stainless Steel trailers, it will pay you to specify U·S·S Stainless Steel. U·S·S Stainless is a perfected and service-tested material that lends itself to the most modern techniques of fabrication.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO • CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
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SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

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UNITED STATES STEEL

NOTICE TO INDUSTRY

**WE'VE
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* Snap a switch; or touch a button. An instant surge of electrical power thru your ESSEX WIRE CORPORATION ELECTRICAL ASSEMBLY activates any unit that you choose to function.

NERVES!

Complete nerve systems for anything you make that is actuated by electricity, from appliances to motor cars, are an old Essex specialty. We've been engineering and fabricating WIRE ASSEMBLIES since the days of the first automobile.

Proper balancing and flow of current; the right flexibility and insulation, and perfected layout and design stem from Essex engineering know-how and experience. Through a network of twenty plants Essex completely engineers, processes and controls the assemblies from wire bar to your appliance. The wire, connectors, terminals, coils and re-

lays made in Essex plants are designed to perform in ESSEX WIRE ASSEMBLIES even if the load should be greater than required under the most severe operating conditions.

ESSEX WIRE ASSEMBLIES are custom tailored to your product. They will make your product's name synonymous with dependable performance in the minds of your customers. They will give you maximum efficiency at minimum cost.

Consult an ESSEX representative, or send your specifications to THE SERVICE ENGINEERING DEPARTMENT of Essex, at Monticello, Ind.

BUILT TO PERFECTION

WIRE ASSEMBLY AND



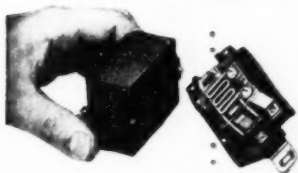
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CORD SET DIVISION

ESSEX WIRE CORPORATION MONTICELLO, INDIANA

INCREASED VALUE

no increase in price



manual motor starters...

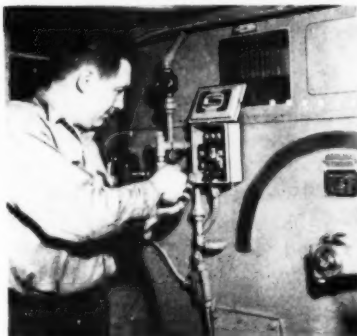
.... feature quick, easy installation; positive overload protection with long-life bi-metallic relays; easy wiring and servicing because terminals are wired from the front. Application—fractional and integral motors up to 7½ horsepower.



The CR1061 controls a handkerchief ironer in a modern laundry.

Roomy, attractive case can be mounted on or beside the machine. Sturdy switch mechanism resists vibration. New push-button as well as toggle-type forms now available for integral motor starting. All forms—watertight, dust-tight, and explosion-proof—available in both lines. Write now for more information. Remember, these new starters have all the features you've been wanting at no increase in price.

The CR1062 is easy to mount and wire. Used here on a coolant pump.



General Electric Company
Apparatus Dept., Sec. L730-9
Schenectady 5, N. Y.

Please send me—
Bulletin GEA-2234E on CR1061 Fractional-hp Motor Starters
Bulletin GEA-1522F on CR1062 Integral Motor Starters

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GENERAL  ELECTRIC

Since 1846

BAIRD HIGH PRODUCTION MACHINES

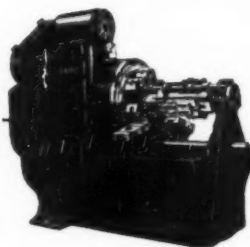
For producing articles made of wire, ribbon metal, castings, forgings or cut off bar stock

● BAIRD 12-Station Duplex Turning Machine is for such as turning the four trunnions on the "spider" or journals for universal joints and forming and facing the yokes of such joints.



BAIRD 12 Station Duplex Turning

● BAIRD 76H Chucker is an Automatic 7" Six Spindle, Indexing, Horizontal Lathe with different speeds available at the work spindles for different operations in the one handling of a piece and with other time saving features.



BAIRD 76H Chucking Machine

● BAIRD 54VC Lathe is an Automatic 5" Four Spindle, Vertical Continuous Machine for many light or finishing cuts on parts, as facing ends or chamfering grooves on pistons, etc.

● BAIRD Multiple Transfer Presses for Multiple operation in one handling on articles made from ribbon metal.

BAIRD ALSO MAKES

BAIRD Four Slide Wire and Ribbon Metal Forming Machines in many sizes to cover the thousands of articles made from wire and ribbon metal.

BAIRD Tumbling Equipment for deburring, smoothing, cleaning, polishing, ball burnishing, heated drying, etc.

Send samples of each article you want to make in quantity.

State the quantities to be made of each piece you want to make in a given time.

Give electrical current specifications.



BAIRD 54VC Lathe

AND
"Ask Baird about it!"

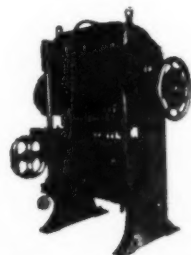


The

BAIRD MACHINE COMPANY

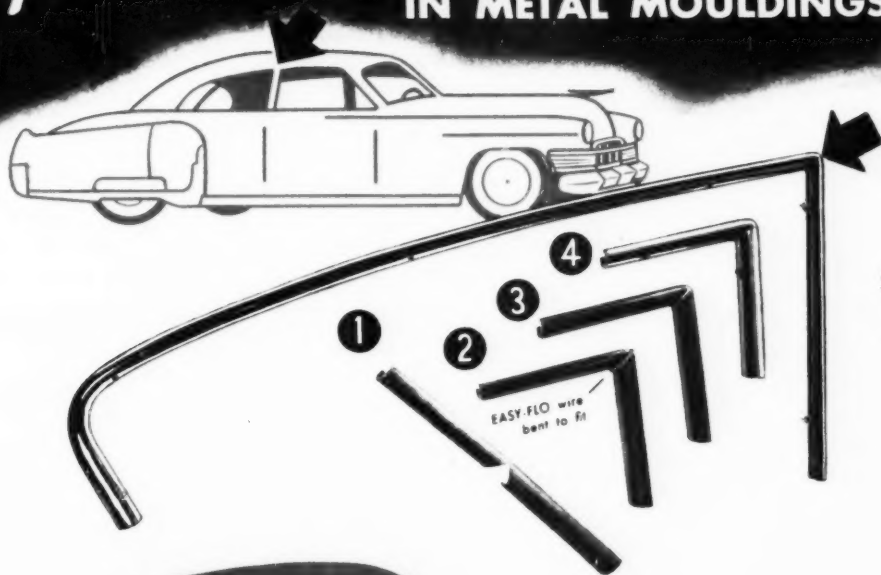
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STRATFORD, CONN.



BAIRD Multiple Transfer Press

A good way TO MAKE SHARP BENDS IN METAL MOULDINGS



Braze them with
EASY-FLO 45

That's the method CADILLAC uses to make the sharp bend in the rear window molding. Here's how it's done.

1 Molding is notched at point of bend, at the correct angle for the required degree of bend.

2 Molding is bent to bring notch sides together, leaving close, uniform clearance. A piece of EASY-FLO wire, bent to fit, is clipped over the joint. Handy Flux is applied with a brush all around the joint and for a little way each side of it to prevent oxidation of the metal.

3 Heating, done by induction, takes only a few seconds. EASY-FLO, being exceptionally fluid, flows into the joint clearance the instant its low working temperature of 1145°F is reached. With no excess left outside, no finishing is needed. Any Handy Flux remaining is readily removed with hot water.

4 The finished joint is every bit as strong as the rest of the molding and, after plating, you could never tell there was a joint.

GET EASY-FLO FACTS IN BULLETINS 12-A AND 15

These bulletins give you the full picture of what you can do with low-temperature EASY-FLO silver alloy brazing — and why it is so fast, reliable and economical. Write for copies today.

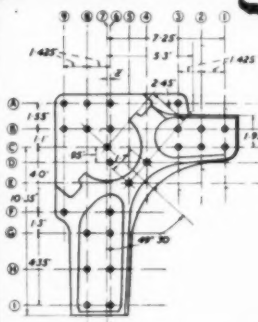
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BULLARD SPACER

Goes Abroad



Coordinates of the various holes are shown superimposed on this drawing of the component. Each hole is identified by one letter and one number for setting on the handwheel.



Performance and Efficiency prove
The Bullard Spacer to be a Profitable
Investment.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

The de Havilland Aircraft Co., Ltd., are getting good results with a Bullard Man-Au-Trol spacer unit which they are now using in conjunction with an Asquith O.D.I. radial drilling machine in their Hatfield works. By eliminating jiggging or marking out in the production of a large range of components, the spacer has cut costs and speeded production. Fig. 1 shows the Asquith radial drill equipped with the spacer unit in use on a comparatively small job for a table of this size, but its versatility may be claimed as an advantage of the device, for it will deal equally well with any work within its capacity. Peacetime production of aircraft obviously calls for a good deal of comparatively small batch work. At de Havilland's they have tooled up extensively for production of their Dove aircraft of which they have sold a large number. But others of their small lots, prototypes and "pilot" production. For this class of work involving machining a few off of widely different components, the company are already satisfied that the Man-Au-Trol spacer unit offers interesting possibilities. It has the advantage, too, that it will work to quite close limits — the makers claim an accuracy of 0.001 in. in spacing.

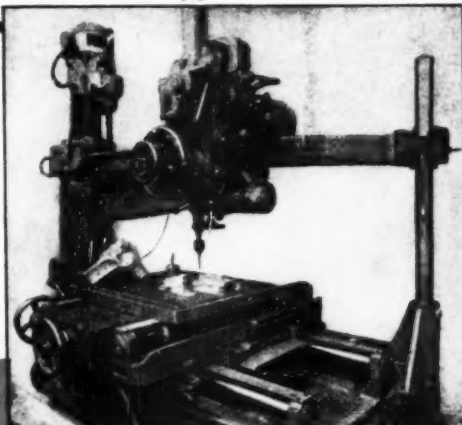


Fig. 1.—At de Havilland's the Bullard Man-Au-Trol spacer unit is mounted on an Asquith O.D.I. radial drill, the arm of the machine being secured by a clamp to an outer supporting column mounted on the base.

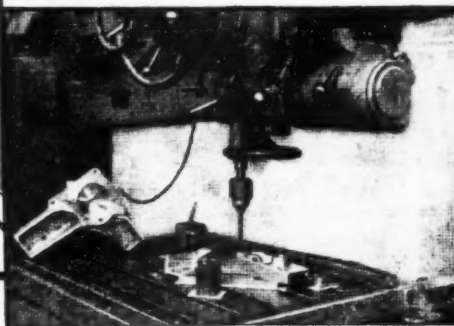
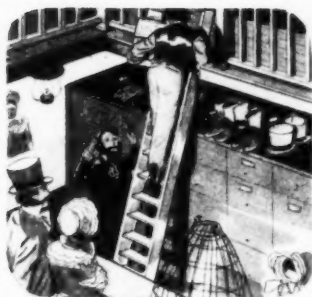
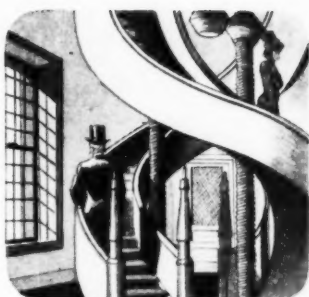


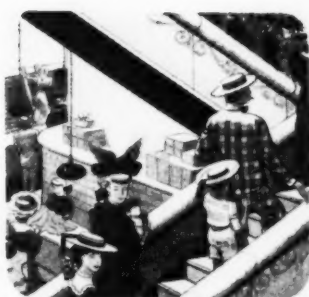
Fig. 2.—Close-up of the table, showing a typical job clamped to the surface ready for drilling. A completed component is also shown on the left of the photograph.



1 1800—For centuries, steps were man's main means of going up. First came the ladder; later, crude steps formed stairways. Even so, man still had to ascend a step at a time under his own power.



2 1875—Stairways took all forms—straight, spiral, plain and ornate. Then, one Samuel Gray patented an "elevator and moving stairway." Though impractical, his idea set others to work.



3 1901—The forerunner of today's moving stairs was installed in a New York store. By 1915, Howell "Red Band" Electric Motors arrived. Soon, these rugged motors were widely applied.

SAVED...20 MILLION STEPS A DAY!

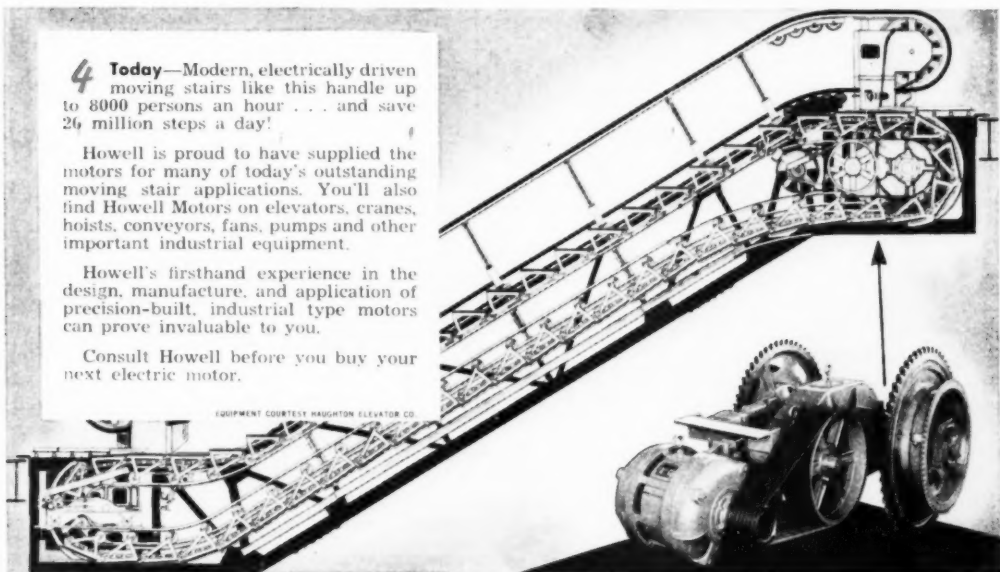
4 Today—Modern, electrically driven moving stairs like this handle up to 8000 persons an hour . . . and save 20 million steps a day!

Howell is proud to have supplied the motors for many of today's outstanding moving stair applications. You'll also find Howell Motors on elevators, cranes, hoists, conveyors, fans, pumps and other important industrial equipment.

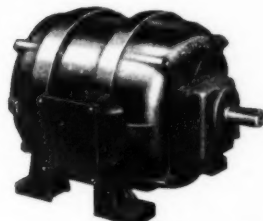
Howell's firsthand experience in the design, manufacture, and application of precision-built, industrial type motors can prove invaluable to you.

Consult Howell before you buy your next electric motor.

EQUIPMENT COURTESY HAUGHTON ELEVATOR CO.



Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.



Elevator Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.
Precision-built Industrial Motors Since 1915



Why you get the most for your money with **TIMKEN**® forging bars

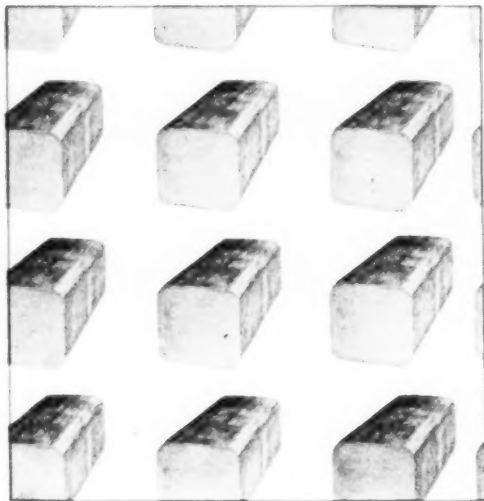


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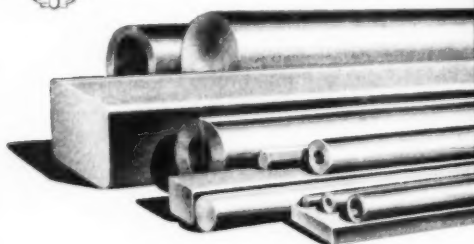
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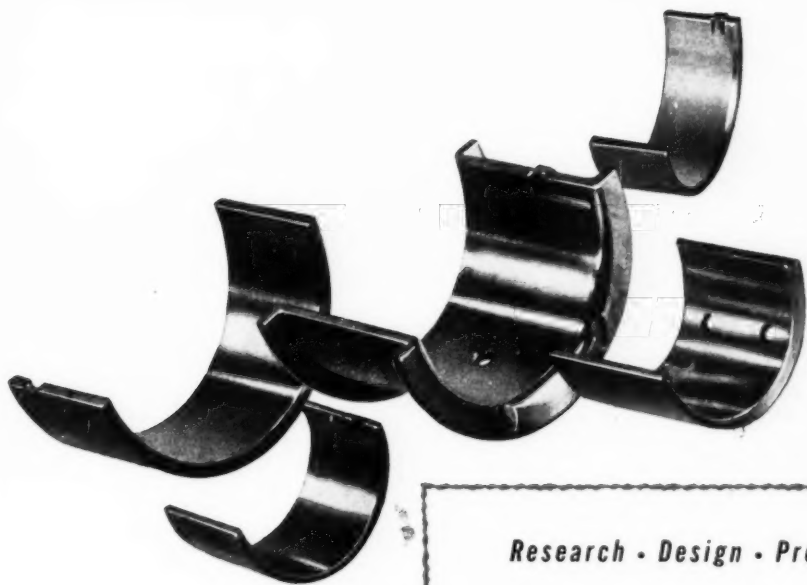
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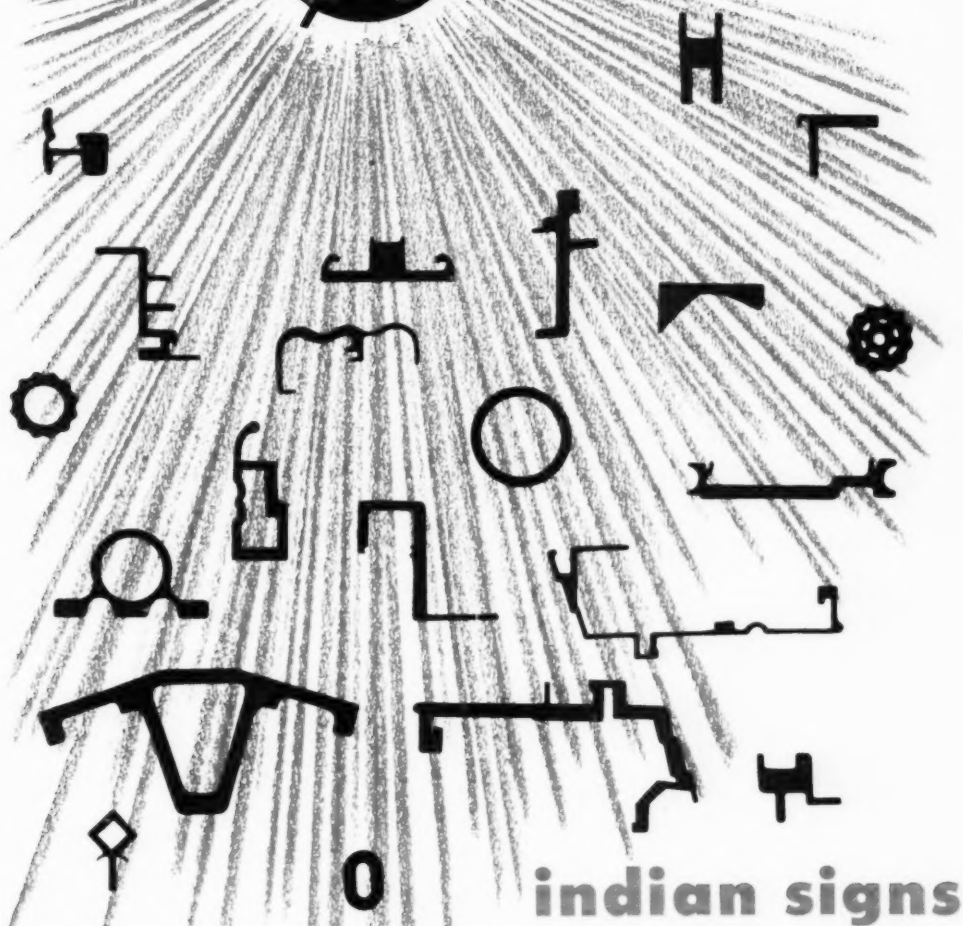


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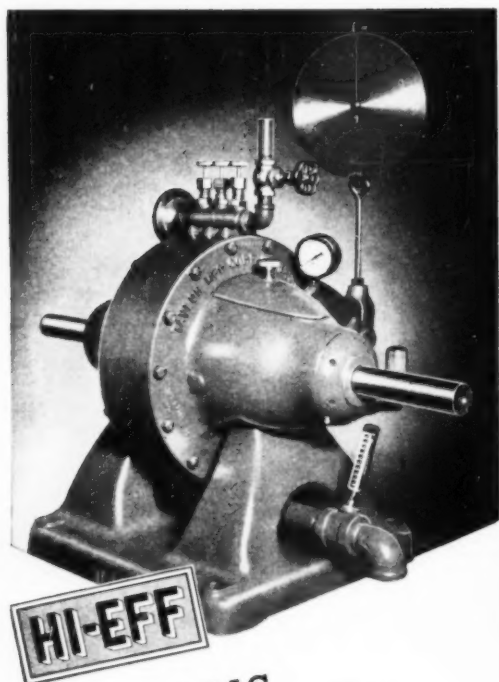


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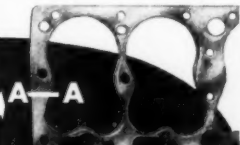
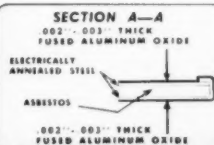
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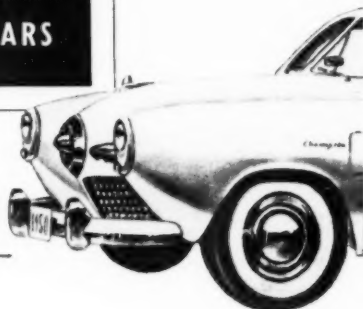
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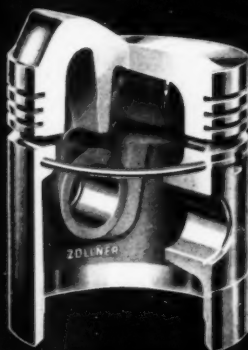
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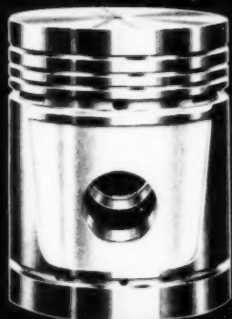
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